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J952-45

An Assessment of

Development and Production Potential of Federal Coal Leases

Volume II—Working Papers

Part F: A Review of Current Production and Anticipated Future Production on Federal Mines and Selected Undeveloped Lease Blocks in Montana and Wyoming

October 1982

CONGRESS OF THE UNITED STATES
Office of Technology Assessment
Washington, D. C. 20510

Preface

This volume contains papers written for OTA to assist in preparation of the report *An Assessment of Development and Production Potential of Federal Coal Leases.* OTA does not endorse these papers. In several instances, the OTA report reaches somewhat different conclusions because of additional information which was obtained later. These papers, however, may prove valuable for readers needing more detailed or specific information than could be accommodated in the final assessment report, and are being made available for such purposes.

WORKING PAPER F

A REVIEW OF CURRENT PRODUCTION AND ANTICIPATED FUTURE PRODUCTION ON FEDERAL MINES AND SELECTED UNDEVELOPED LEASE BLOCKS IN MONTANA AND WYOMING

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Earth Resource Associates
44 North Last Chance Gulch
Helena, Montana 59601

Prepared for

Materials Program
Office of Technology Assessment
U. S. Congress
Washington, D. C. 20510

January 15, 1982

OTA WORKING PAPER

This report is an OTA Working Paper, which was used in the preparation of OTA's final report An Assessment of the Development and Production Potential of Federal Coal Leases. OTA makes these working papers available for the use of readers desiring more detailed or technical information than could be accommodated in our final report. As an OTA working paper, this report has not been reviewed or approved by the Technology Assessment Board. The findings and conclusions expressed in the report are those of the authors and do not necessarily reflect the views of OTA, the coal leasing project advisory panel, or the Technology Assessment Board.

DATA FOR EXISTING AND PROPOSED MINES ON FEDERAL LEASEBLOCKS, POWDER RIVER BASIN, MONTANA AND WYOMING

The Powder River coal basin (Fig. 1) is the most significant coal region in the western United States. This area has the largest amount of undeveloped leased federal coal in the United States, and current production accounts for about half of all federal coal production in the country. (OTA, 1981)* This report summarizes non-confidential data concerning mines in the basin which at least in part produce federal coal and those leases which have been rated by OTA (1981, Table 63) as having favorable development prospects. Basic data is included concerning coal reserves, mining methods, leases, and production expectations. Discussion is included on the background and issues faced at each mine. Summary tables are included which aggregate much of the mine-specific data.

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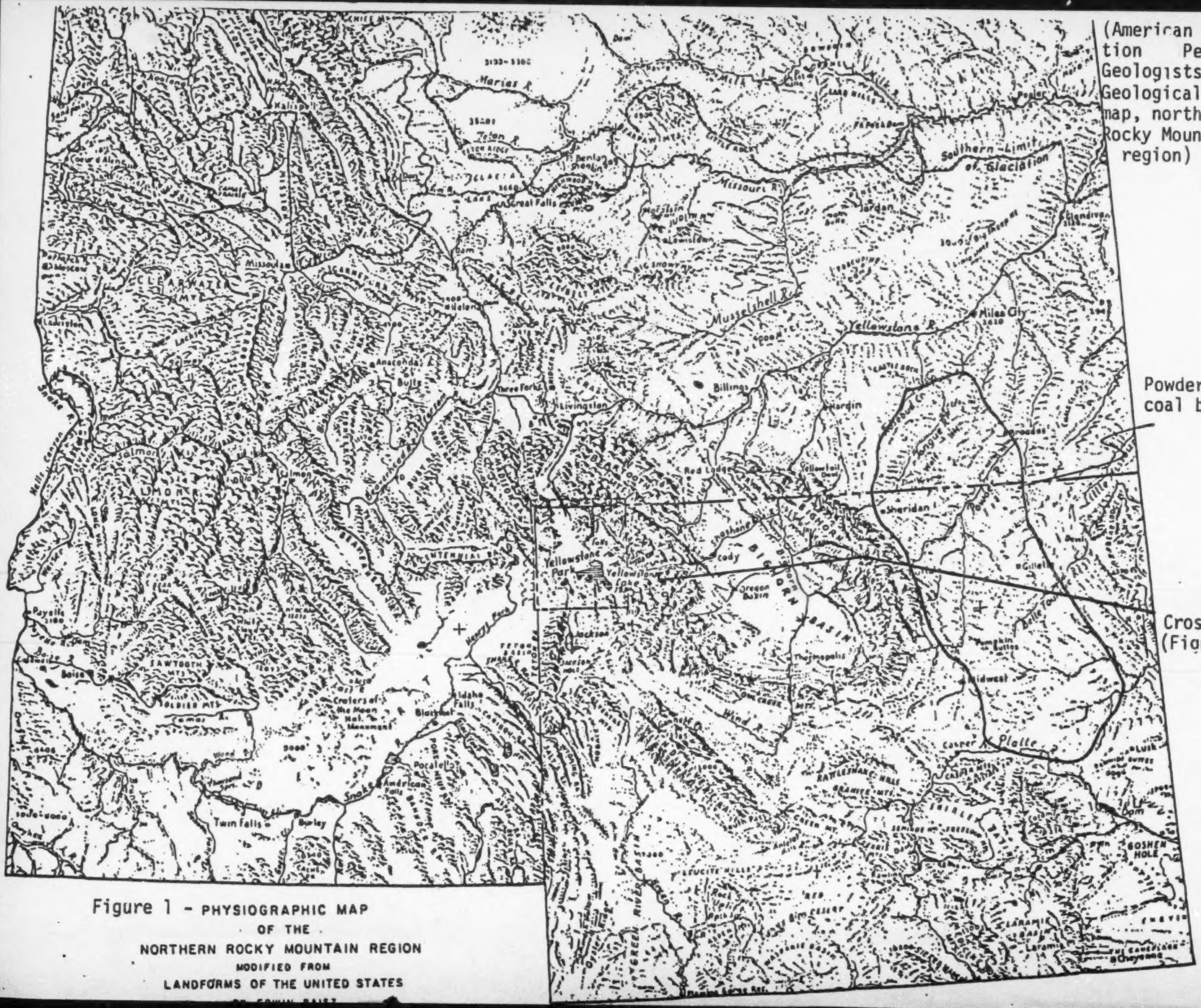
*Office of Technology Assessment, 1981. An assessment of development and production potential of federal coal leases, 473 p.


Marias R.
Teton R.
Kalispell
Great Falls
Missouri R.
Southern Limit of Glaciation
Jordan
Missoula
Clearwater Mts
Lewiston
Helena
Musselshell R.
Yellowstone R.
Miles City
Anaconda
Butte
Three Forks
Livingston
Billings
Hardin
Salmon
Red Lodge
Sheridan
Centennial Mts
Yellowstone Park
Yellowstone Lake
Cody
Big Horn Basin
Gillette
Payette
Boise
Sawtooth Mts
Craters of the Moon Nat. Monument
Idaho Falls
Blackfoot
Jackson
Thermopolis
Midwest
Wind R.
Casper
Platte R.
Pocatello
American Falls
Snake R.
Twin Falls
Burley
Rattlesnake Hills
Goshen Hole
Laramie
Cheyenne

(American Association Petroleum Geologists, 1972. Geological highway map, northern Rocky Mountain region)

Powder River coal basin

Cross-sectio
(Figure II-2

Figure 1 - PHYSIOGRAPHIC MAP OF THE NORTHERN ROCKY MOUNTAIN REGION MODIFIED FROM LANDFORMS OF THE UNITED STATES BY EDWIN RAISZ

CHAPTER I
STUDY METHODS

Data reported and evaluated in this report was collected from several sources: (1) mine plans and technical analyses on file at Region V, U. S. Office of Surface Mining and Montana Department of State Lands, (2) environmental impact statements, (3) General Mining Order No. 1 submittals to the U. S. Geological Survey, (4) interviews with regulatory and industry staff, and (5) specific requested data supplied by companies. The data included is current to 1981, with reference made to the most current mine plan (Table I-1). In some cases, data supersedes that included in OTA (1981) due to changes in industry's mining plans. Only data considered non-proprietary is included. Reserve data includes estimates of mineable and recoverable reserves. In-place reserve estimates have not been included because there are no reliable and consistent estimates of reserves at depth at each mine. What estimates do exist are confidential. Thus, mineable reserve estimates indicate the tonnage industry feels is presently surface mineable, and does not include estimates of non-surface mineable reserves. Table I-2 summarizes the definitions of terms.

Mine capacity is reported as ultimate design capacity, except in Table III-1 and II-4, where it is also reported as existing design capacity. Capacity reported in Table II-4 is for the year noted. Definition of these terms is outlined in Table I-2. Production estimates are those reported by the companies.

TABLE I-1
AVAILABLE DATA FOR POWDER RIVER BASIN MINES

Mine	Date of Latest EIS or EA	Date of Latest Permit Application
Buckskin	Eastern Powder River EIS, 1979, BLM; Environmental Assessment, 1980, OSM	Revised, April 1981
Belle Ayr	Eastern Powder River EIS, 1979, BLM	December 1980
Eagle Butte	Eastern Powder River EIS, 1979, BLM	June 1981
Rawhide	Eastern Powder River EIS, 1979, BLM Environmental Assessment, 1980, OSM	January 1981
Wyodak	Baseline Environmental Assessment, 1980, OSM	January 1981
Rojo Caballos (Caballo Rojo)	Proposed Mining and Reclamation Plan Rojo Caballos Mine EIS, Feb. 1981	December 1981
Cordero	Baseline Eastern Powder River EIS, 1979, BLM	January 1981
Coal Creek	Baseline Eastern Powder River EIS, 1979, BLM Environmental Assessment, 1979, OSM	December 1980
Caballo	Baseline Eastern Powder River EIS Environmental Assessment, 1980, OSM	January 1981
Jacobs Ranch	Baseline Eastern Powder River Coal EIS	January 1981
Dave Johnston	Baseline Eastern Powder River Coal EIS Environmental Assessment, 1979, OSM	July 1981
Black Thunder	Baseline Eastern Powder River Coal EIS	Revised, August 1981
Spring Creek	Final EIS, Spring Creek Mine, DSL, 2/79	Revised, October 1981
West Decker	Draft EIS, West Decker Mine, DSL, 1/81 Technical Environmental Assessment, DSL and OSM, 1980	Revised, March 1930
North Decker	Final EIS Supplement, North Decker Extension, DSL, 1/82; Technical Environmental Assessment, DSL and OSM, 1/82	Revised September 1981
East Decker	Final EIS, East and North Decker Mines, DSL, 1977	July 1981
Peabody	Final EIS, Big Sky Mine, DSL, 9/79	Revised, October 1979
Rosebud, Area A	Final EIS, Western Energy Area A, DSL, 6/77	September 1981
Rosebud, Area B	Final EIS, Western Energy, Area B, DSL, 11/80; Technical Environmental Assessment, DSL and OSM, 11/80	Revised, October 1981
Rosebud, Area E	Final EIS, Western Energy Area E, DSL, 8/81 Technical Environmental Assessment, DSL and OSM, 9/81	Revised, September 1981

TABLE I-2
RESERVE DEFINITIONS CLASSIFICATION
(adapted from U. S. Geological Survey, 1980)

Coal Reserve Base - tons of coal in place (not included in this report)

Mineable Reserve Base - tons of coal in place which is commercially mineable

Recoverable Reserves - tons of coal that can be commercially mined, but not including coal which will be left in pillars, fenders, property barriers, or areas where coal has been prohibited from mining due to regulatory decision, e.g., lands designated unsuitable for mining, designated alluvial valley floors determined to be significant to farming. Includes lands mineable if proper reclamation is demonstrated, e.g., designated alluvial valley floors determined to be insignificant to farming, lands underlying prime farmlands.

Capacity - the ability to produce coal, measured in tons per year, as limited by the major plant facilities at the mine, i.e., storage and loading facilities, draglines. Does not consider availability of smaller scale equipment, i.e., scrapers, shovels, trucks, nor does it include manpower availability.

Ultimate Mine Design Capacity - the greatest capacity which the operator plans on developing at the mine, in terms of major plant facility coal handling capability

Existing Mine Capacity - the present capacity of the operator to produce coal, in terms of major plant facilities, and not in terms of manpower or smaller equipment availability.

Reference: U. S. Geological Survey, Conservation Division, Northern Rocky Mountain Area, 1980, General mining order no. 1: March 1, 13 p.

CHAPTER II
GEOGRAPHY OF LEASES AND MINE STATISTICS

Geography of Federal Leases

Federal coal leases in the Powder River coal basin are concentrated around Colstrip and Decker, Montana and in a 75- by 6-mile area extending north and south from Gillette, Wyoming. Scattered leases are also found in Sheridan, Johnson, and Converse Counties, Wyoming. All federal leases in the Powder River coal basin cover over 160,000 acres having an estimated recoverable reserve base of over 9 billion tons. (OTA, 1981) All of the coal is subbituminous in rank.

The most significant area of existing federal leaseblocks is the Gillette, Wyoming area. Leases extend in an arc, approximately 75 miles from the Wildcat leaseblock, about 17½ miles northwest of Gillette, to the proposed Antelope Mine, about 56½ miles south-southeast of Gillette (Fig. II-1). No leaseblock in this belt is more than six miles in width (measured east-west), and most are about three miles in width. These leases are all located along the eastern side of the Powder River coal basin, an area where target coal seams dip gently westward at less than 3^{0}. Leases generally begin near the eastern outcrop of the target seams and extend westward as the seam, or seams, get deeper (Fig. II-2). Usually, the economical limits of mining are found beyond the boundaries of existing leaseblocks, and all coal up to the lease boundary is recovered.

The target coal seam of all the leases in the Gillette area is the Wyodak. At its thickest, around Gillette, the seam ranges from 65 to 100 feet in thickness, and sometimes has a thin parting a few feet thick within it. The Buckskin, Rawhide, Eagle Butte, Wyodak, Caballo, Belle Ayr,

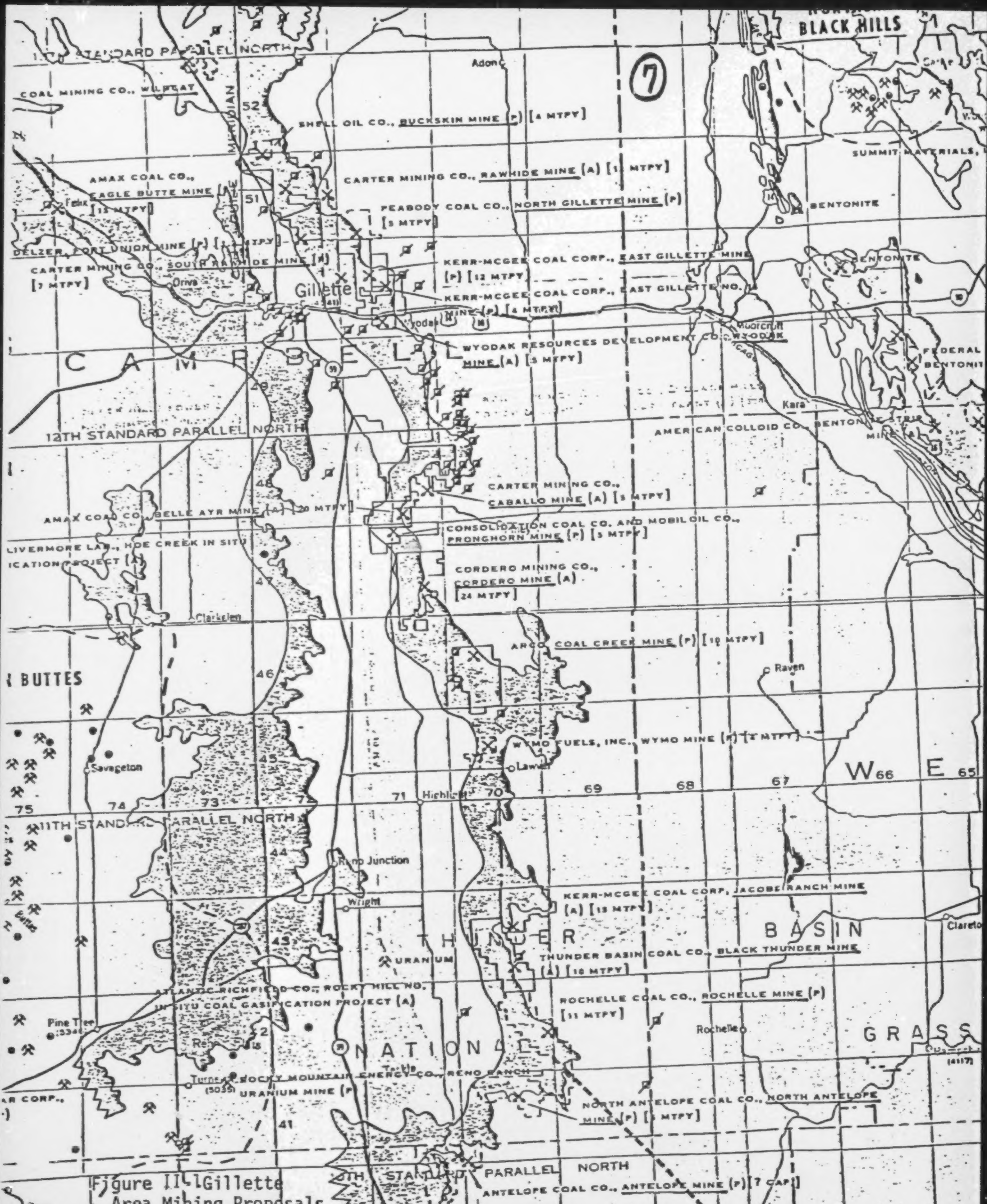

⑦
BLACK HILLS
11TH STANDARD PARALLEL NORTH
COAL MINING CO., WILDCAT
MERIDIAN
52
SHELL OIL CO., BUCKSKIN MINE (P) [4 MTPY]
AMAX COAL CO., EAGLE BUTTE MINE [15 MTPY]
CARTER MINING CO., RAWHIDE MINE (A) [1? MTPY]
PEABODY COAL CO., NORTH GILLETTE MINE (P) [5 MTPY]
51
DELZER, FORT UNION MINE (P)
CARTER MINING CO., SOUTH RAWHIDE MINE (P) [7 MTPY]
KERR-MCGEE COAL CORP., EAST GILLETTE MINE (P) [12 MTPY]
KERR-MCGEE COAL CORP., EAST GILLETTE NO. MINE (P) [4 MTPY]
Gillette
Wyodak
Moorcroft
WYODAK RESOURCES DEVELOPMENT CO., WYODAK MINE (A) [5 MTPY]
SUMMIT MATERIALS
BENTONITE
FEDERAL BENTONITE
C A M P B E L L
12TH STANDARD PARALLEL NORTH
Kara
AMERICAN COLLOID CO., BENTONITE STRIP MINE (A)
49
48
CARTER MINING CO., CABALLO MINE (A) [5 MTPY]
AMAX COAL CO., BELLE AYR MINE (A) [20 MTPY]
CONSOLIDATION COAL CO. AND MOBILOIL CO., PRONGHORN MINE (P) [5 MTPY]
LIVERMORE LAB., HOE CREEK IN SITU ICATION PROJECT (A)
CORDERO MINING CO., CORDERO MINE (A) [24 MTPY]
47
Clarkelen
ARCO COAL CREEK MINE (P) [10 MTPY]
BUTTES
46
Raven
WYMO FUELS, INC., WYMO MINE (P) [2 MTPY]
Savageton
45
Lawver
75
74
73
71
Highlight
70
69
68
67
W66 E 65
11TH STANDARD PARALLEL NORTH
44
Reno Junction
Wright
KERR-MCGEE COAL CORP, JACOBS RANCH MINE (A) [15 MTPY]
T H U N D E R B A S I N
URANIUM
43
THUNDER BASIN COAL CO., BLACK THUNDER MINE (A) [10 MTPY]
ATLANTIC RICHFIELD CO., ROCKY HILL NO. IN SITU COAL GASIFICATION PROJECT (A)
ROCHELLE COAL CO., ROCHELLE MINE (P) [11 MTPY]
Rochelle
Pine Tree
GRASS
N A T I O N A L
Turner (5035)
ROCKY MOUNTAIN ENERGY CO., RENO RANCH URANIUM MINE (P)
NORTH ANTELOPE COAL CO., NORTH ANTELOPE MINE (P) [5 MTPY]
41
10TH STANDARD PARALLEL NORTH
ANTELOPE COAL CO., ANTELOPE MINE (P) [7 CAP]
40
Ross
URANIUM
Dull Center (4354)
Clareton

Figure II-1 Gillette Area Mining Proposals (Hausel et al., 1979, Wyoming Mines and Minerals Map)

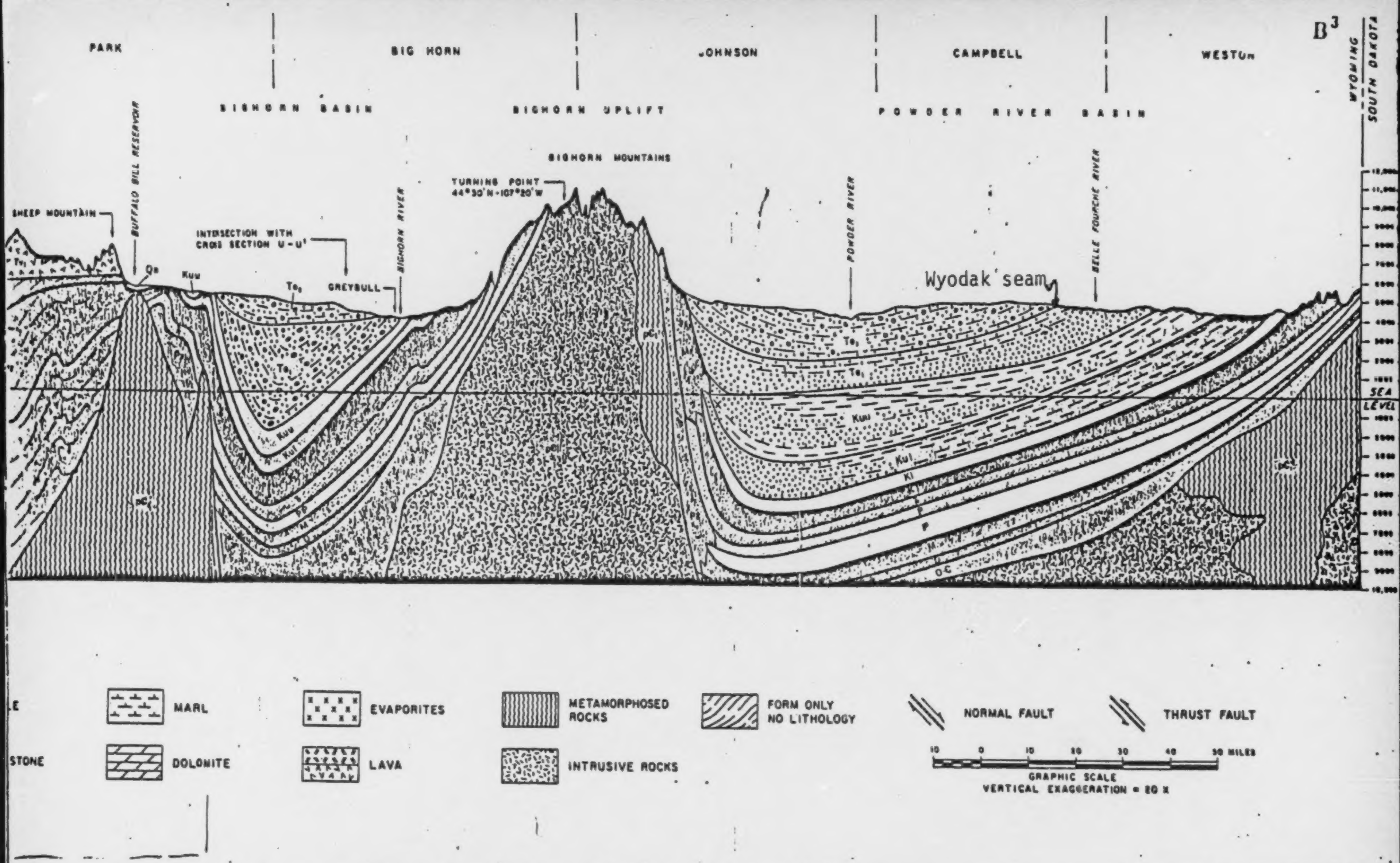

B3
WYOMING
SOUTH DAKOTA
PARK
BIG HORN
JOHNSON
CAMPBELL
WESTON
BIGHORN BASIN
BIGHORN UPLIFT
POWDER RIVER BASIN
BIGHORN MOUNTAINS
TURNING POINT 44°30'N-107°20'W
SHEEP MOUNTAIN
BUFFALO BILL RESERVOIR
INTERSECTION WITH CROSS SECTION U-U'
GREYBULL
BIGHORN RIVER
POWDER RIVER
Wyodak seam
BELLE FOURCHE RIVER
SEA LEVEL
Qa
Kuu
Kul
Kl
Te
P
pC
LE
STONE
MARL
DOLOMITE
EVAPORITES
LAVA
METAMORPHOSED ROCKS
INTRUSIVE ROCKS
FORM ONLY NO LITHOLOGY
NORMAL FAULT
THRUST FAULT
10 0 10 20 30 40 50 MILES
GRAPHIC SCALE
VERTICAL EXAGGERATION = 20 X

Figure II-2.Cross-section across Powder River basin (see Fig. 1 for location) (AAPG, 1972) and Caballo Rojo Mines all develop this essentially single thick seam. At the Wildcat leaseblock, north of the Buckskin Mine, the Wyodak splits into several seams, a situation which increases the complexity of mine development. South of Caballo Rojo, the Wyodak-Anderson splits, rejoins, and splits again to the south. For example, two seams are the target of mining at the Coal Creek Mine, one seam at the Jacobs Ranch and Black Thunder Mines, and two seams at the proposed Antelope Mine (Fig. II-3). The heating content of Gillette area coal ranges from 7,500 to 8,000 BTU/lb and sulfur content from 0.3 to 0.5 percent (Table II-1).

The arc of leases is located on gently rolling land which slopes to the northeast and east. Leases north of Gillette eventually drain to the Little Powder River (Fig. II-4). Leases south of Gillette to and including the Coal Creek Mine drain to the Belle Fourche River (Fig. II-5), while leases further south drain to the Cheyenne River (Fig. II-6). Elevation in the southern part of the arc ranges between 4,700 and 4,900 feet, and elevations north of Gillette range from 4,200 to 4,400 feet. Relief on any particular leaseblock rarely exceeds 200 feet, and is often less than 100 feet. Relief in the entire Powder River basin is caused by sandstone and clinker beds which have resisted erosion while streams have eroded valleys elsewhere.

Other federal lease areas are less concentrated than those of the Gillette area. Around Decker, Montana six leaseblocks are held, three of which are operating coal mines (Fig. II-7). These leases focus on an 80-foot thick coal seam at the Spring Creek lease, which splits eastward on the East Decker and West Decker leases, as well as to the south and west on the CX Ranch and Pearl leases. This area is along the western margin of the Powder River basin. Variations in the depth of the target

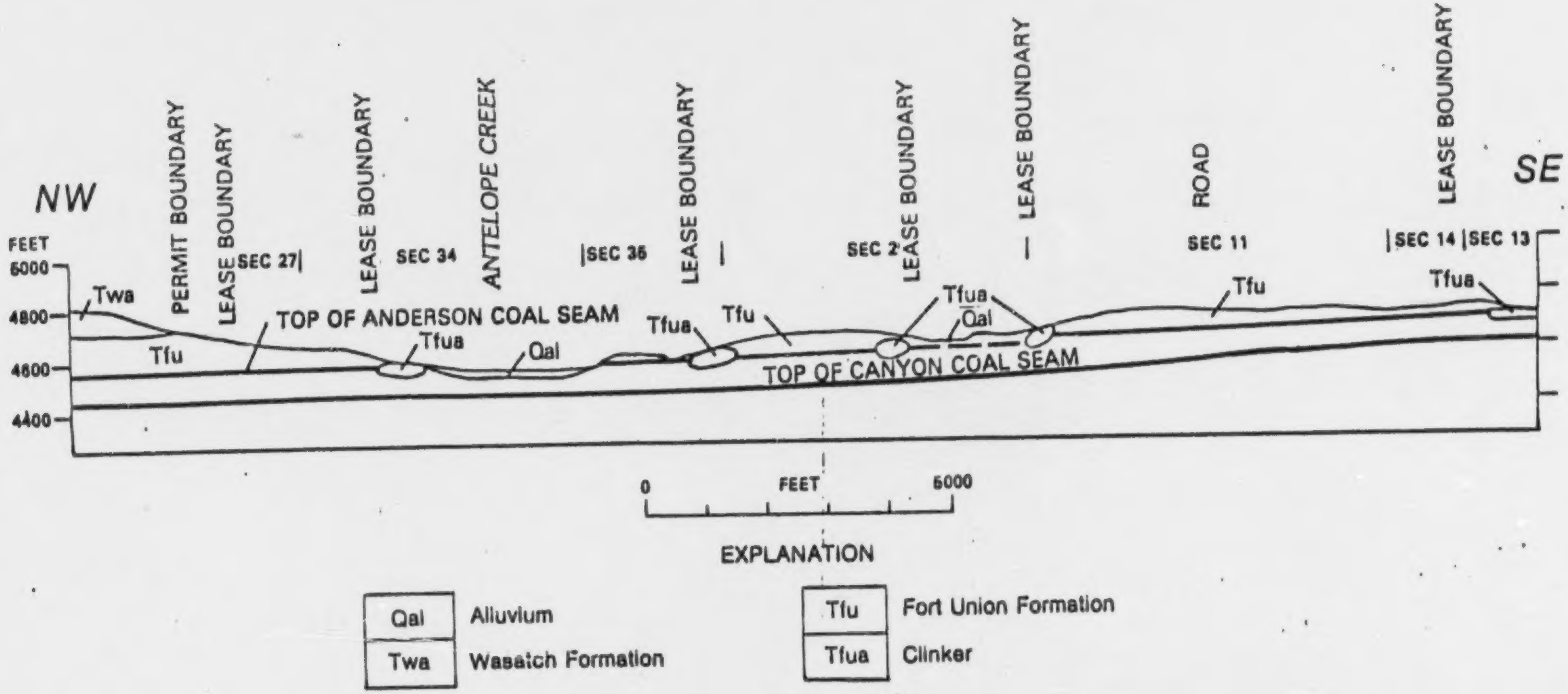

NW
SE
FEET
5000
4800
4600
4400
PERMIT BOUNDARY
LEASE BOUNDARY
SEC 27
LEASE BOUNDARY
SEC 34
ANTELOPE CREEK
SEC 35
LEASE BOUNDARY
SEC 2
LEASE BOUNDARY
LEASE BOUNDARY
ROAD
SEC 11
LEASE BOUNDARY
SEC 14
SEC 13
Twa
Tfu
TOP OF ANDERSON COAL SEAM
Tfua
Qal
Tfua
Tfu
Tfua
Qal
Tfu
Tfua
TOP OF CANYON COAL SEAM
0
FEET
5000
EXPLANATION
Qal
Alluvium
Twa
Wasatch Formation
Tfu
Fort Union Formation
Tfua
Clinker

Figure II-3. Geologic Section, Antelope Mine
(U. S. Office of Surface Mining, 1981, Proposed mining and reclamation plan, Antelope Mine, draft environmental impact statement, Fig. III-1)

TABLE II-1
COAL QUALITY DATA FOR GILLETTE AREA FEDERAL MINES*

Mine	BTU/1b	Sulphur (%)	Ash (%)
Buckskin	8177	0.51	6.17
Rawhide	8227	0.34	5.18
Eagle Butte	8282	0.44	5.15
Wyodak	8000	0.5	6
Caballo	8357	0.34	5.27
Belle Ayr	8485	0.36	5.33
Caballo Rojo	8310	0.34	5.6
Cordero	8331	0.33	5.9
Coal Creek	7820-8080	0.32-0.39	--
Jacobs Ranch	8600	0.48	5.89
Black Thunder	8665	0.33	--

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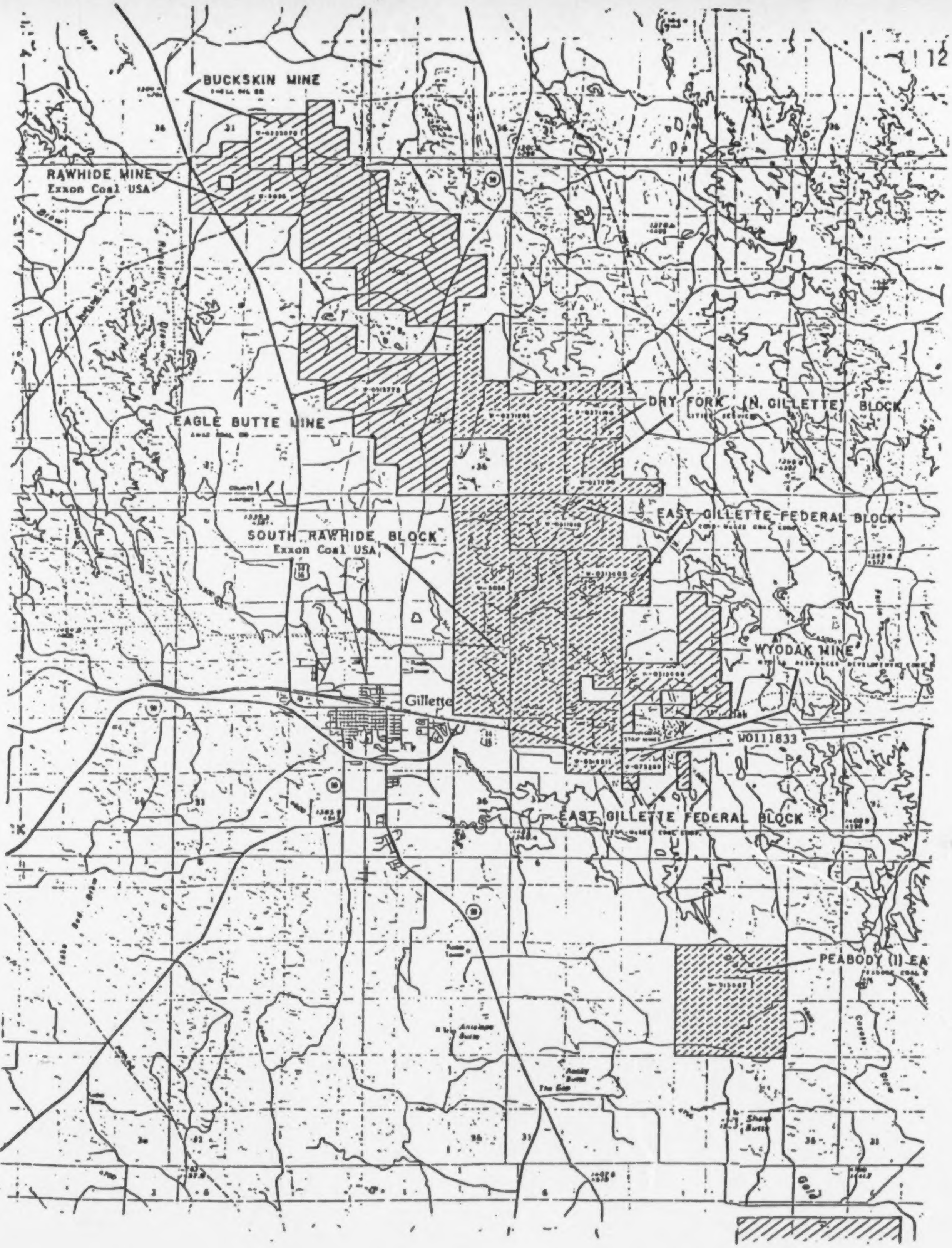
*Data from mine plans on file at U. S. Office of Surface Mining, Denver


BUCKSKIN MINE
RAWHIDE MINE
Exxon Coal USA
EAGLE BUTTE MINE
DRY FORK (N. GILLETTE) BLOCK
EAST GILLETTE FEDERAL BLOCK
SOUTH RAWHIDE BLOCK
Exxon Coal USA
WYODAK MINE
Gillette
W0111833
EAST GILLETTE FEDERAL BLOCK
PEABODY (I) EA

FigureII-4. Federal Leaseblocks near Gillette, Wyoming

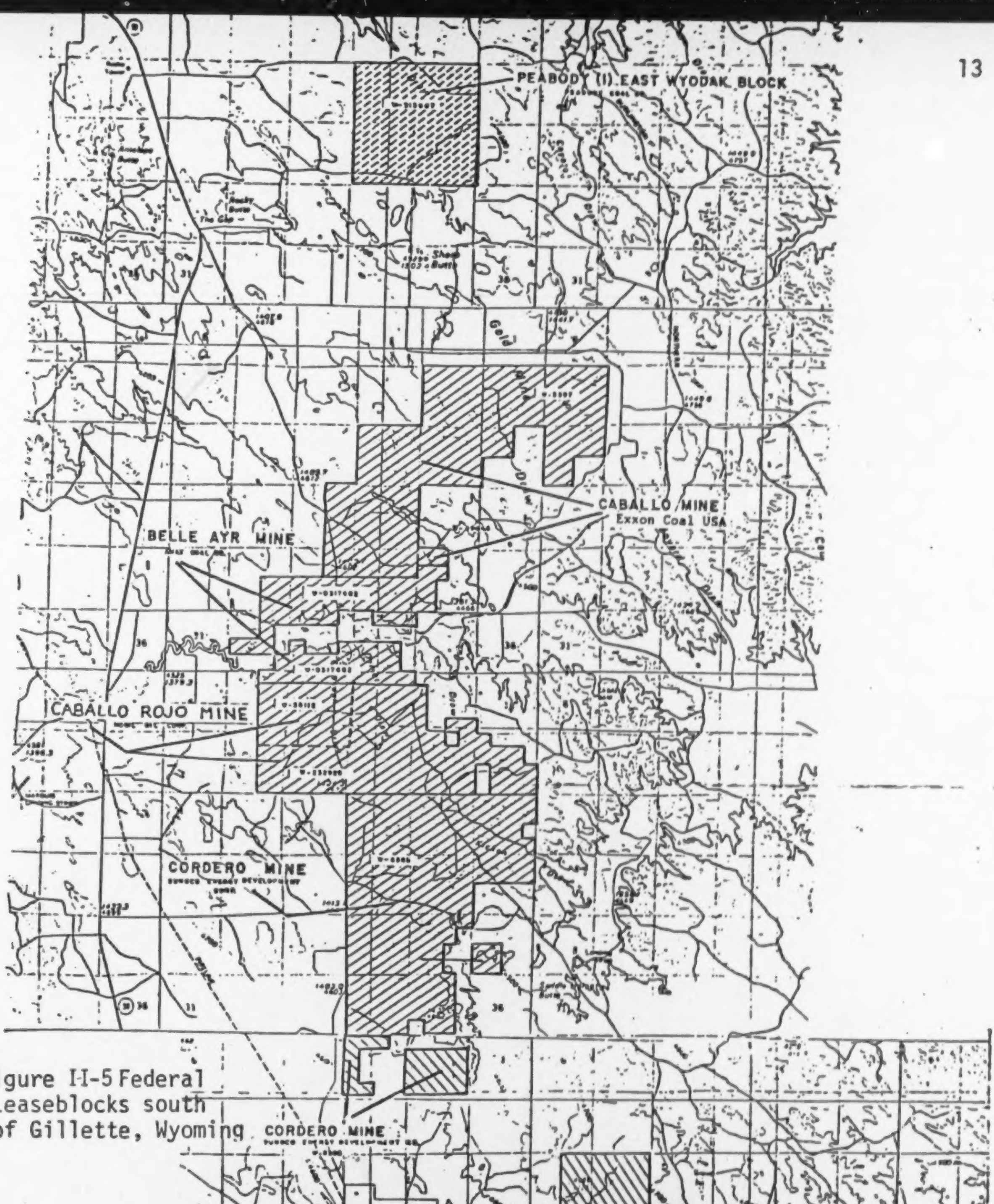
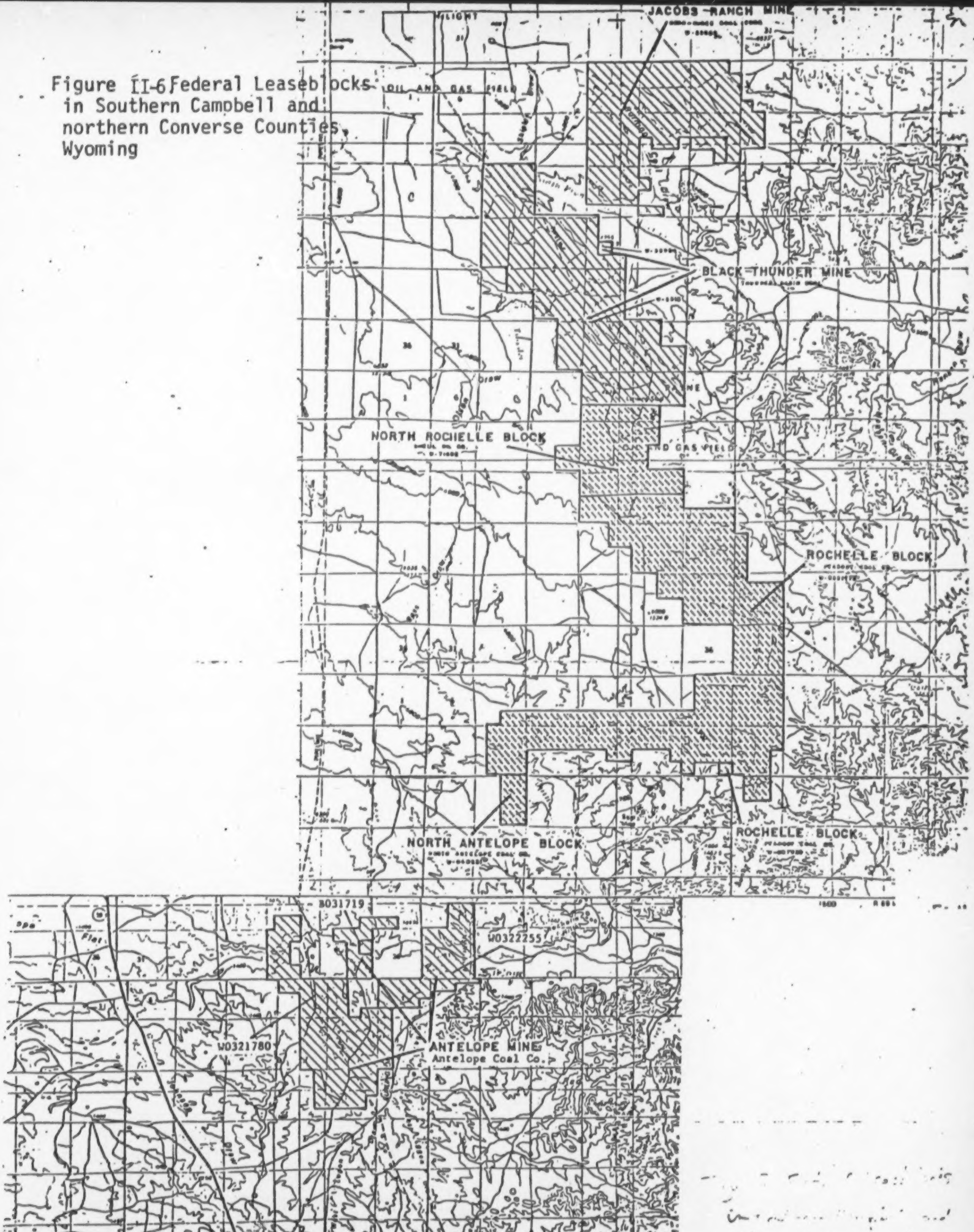

PEABODY (I) EAST WYODAK BLOCK
CABALLO MINE
Exxon Coal USA
BELLE AYR MINE
CABALLO ROJO MINE
CORDERO MINE
CORDERO MINE
HILIGHT OIL AND GAS
COAL CREEK MINE

Figure II-5 Federal Leaseblocks south of Gillette, Wyoming

Figure II-6 Federal Leaseblocks in Southern Campbell and northern Converse Counties, Wyoming


JACOBS RANCH MINE
OIL AND GAS FIELD
BLACK THUNDER MINE
NORTH ROCHELLE BLOCK
ROCHELLE BLOCK
NORTH ANTELOPE BLOCK
ROCHELLE BLOCK
W031719
W0322255
W0321780
ANTELOPE MINE
Antelope Coal Co.

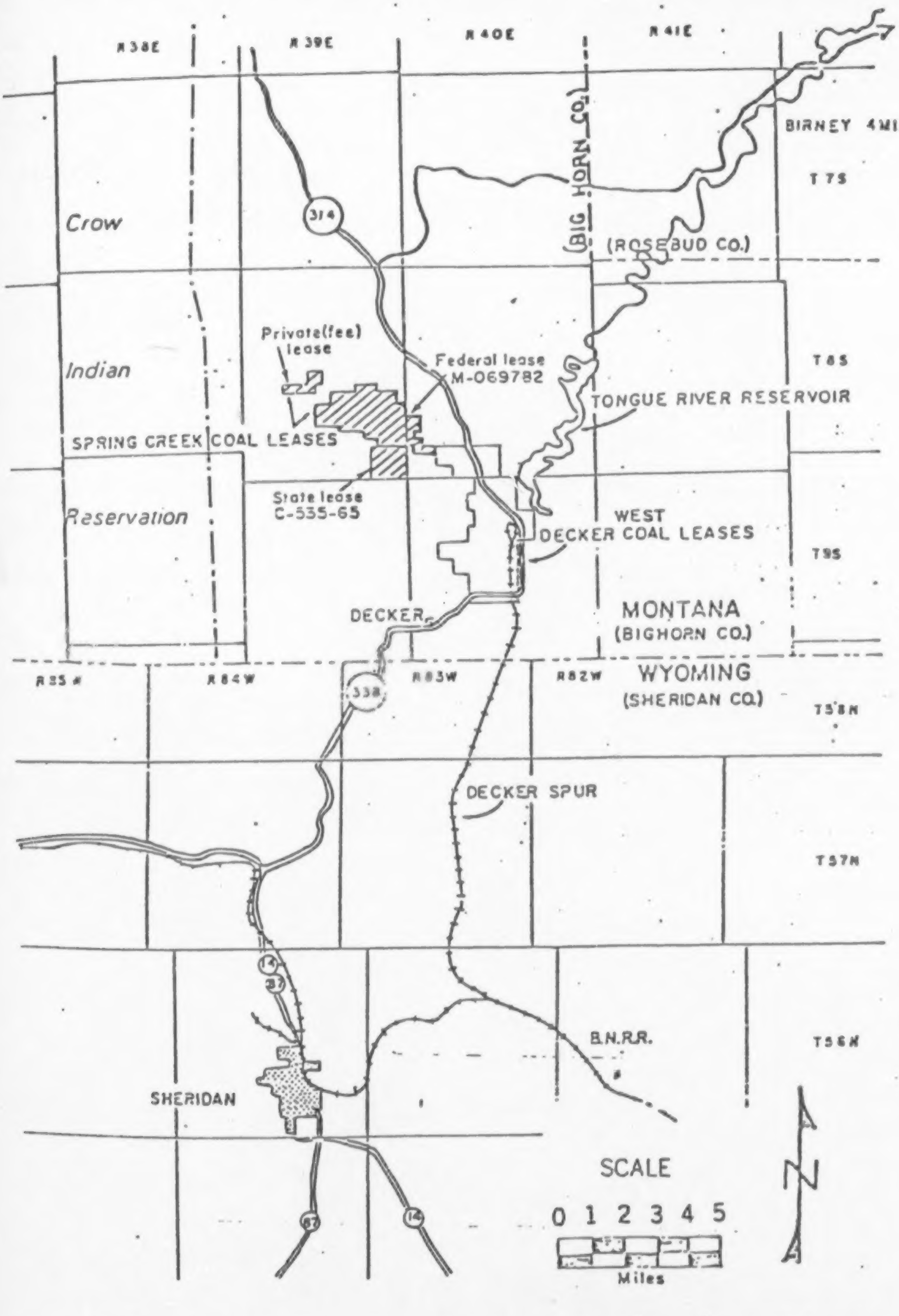

R 38E
R 39E
R 40E
R 41E
BIG HORN CO.
BIRNEY 4 MI.
T 7S
314
Crow
(ROSEBUD CO.)
Private(fee) lease
Federal lease M-069782
T 8S
Indian
TONGUE RIVER RESERVOIR
SPRING CREEK COAL LEASES
State lease C-535-65
Reservation
WEST DECKER COAL LEASES
T 9S
DECKER
MONTANA (BIGHORN CO.)
R 85 W
R 84 W
R 83 W
R 82 W
WYOMING (SHERIDAN CO.)
338
T 58 N
DECKER SPUR
T 57 N
14
87
B.N.R.R.
T 56 N
SHERIDAN
SCALE
0 1 2 3 4 5
Miles
N
87
14

Figure II-7 General location map of Decker area coal leases. (USGS and Mt. DSL, 1979, fig. I-2)

seams have resulted in different seams being considered mineable at each property. The average heating content of coal at leases in this area is from 9,100 to 9,700 BTU/lb with sulfur contents of 0.3 to 0.5 percent (Table II-2). These leases drain to tributaries of the Tongue River, at elevations ranging from 3,500 to 4,000 feet.

Two large leaseblocks around Colstrip, Montana are being developed in an area draining to minor tributaries of the Yellowstone River (Fig. II-8). Elevations in this area are about 3,500 feet. This area along the northern margin of the basin has one or two target coal seams, averaging 20 to 35 feet in total thickness. Heating content of coal in this area is from 8,300 to 8,600 BTU/lb and sulfur content is from 0.7 to 2 percent. Isolated federal leases are found in the Sheridan, Spotted Horse, and Buffalo coal fields of Sheridan and Johnson Counties, Wyoming. These leases focus on seams exposed along the western margin and center of the Powder River coal basin. Heating content of these coals is generally between 6,500 and 7,500 BTU/lb.

About 25 miles southwest of the Gillette belt of leases are found federal leaseblocks in the Dry Cheyenne and Glenrock coal fields, in areas tributary to the Cheyenne River (Fig. II-9). At the Dave Johnston Mine, two seams ranging from 15 to 35 feet in thickness are being mined. These seams range from 7,700 to 8,000 BTU/lb with sulfur concentrations of 0.5 to 0.6 percent.

In the Gillette area, federal leaseblocks are compact and often form large contiguous blocks. Mines develop coal up to their lease borders, which may also be the mining limit of an adjoining mine. Private and state-owned coal comprise minor parts of the integrated mine plans developed in this region. In contrast is the Colstrip area, where

TABLE II-2
COAL QUALITY DATA FOR DECKER AREA FEDERAL MINES*

Mine	BTU/lb	Sulphur (%)	Ash (%)
Spring Creek	9407	0.33	3.63
West Decker	9262-9553	0.33-0.38	3.73-5.25
East Decker	9175-9707	0.39-0.48	3.67-5.82

*Data from mine plans on file at U. S. Office of Surface Mining, Denver

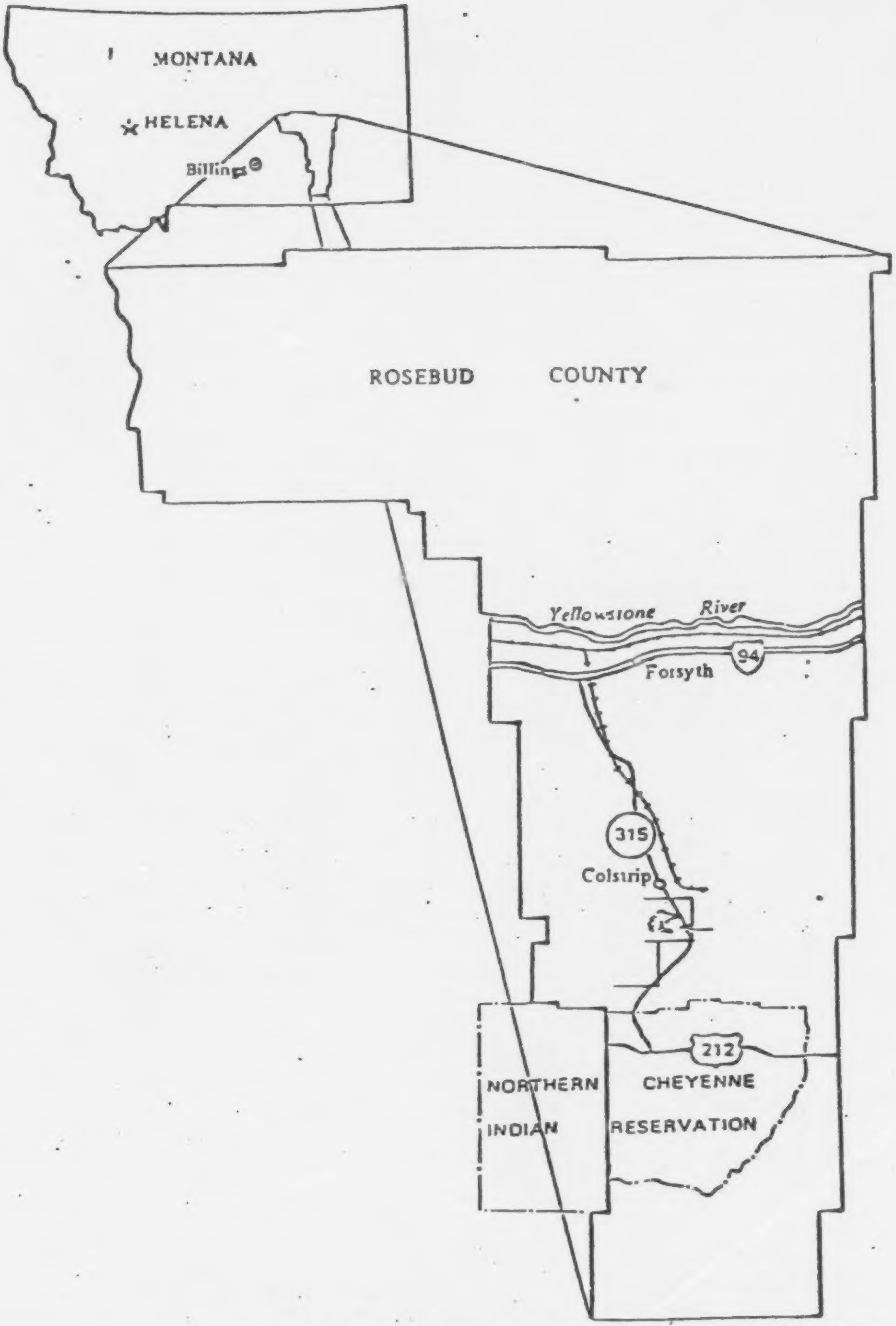

MONTANA
HELENA
Billings
ROSEBUD COUNTY
Yellowstone River
94
Forsyth
315
Colstrip
212
NORTHERN
INDIAN
CHEYENNE
RESERVATION

Figure II-8 - General location of Colstrip, Montana
(Mt. DSL and USGS, 1978)

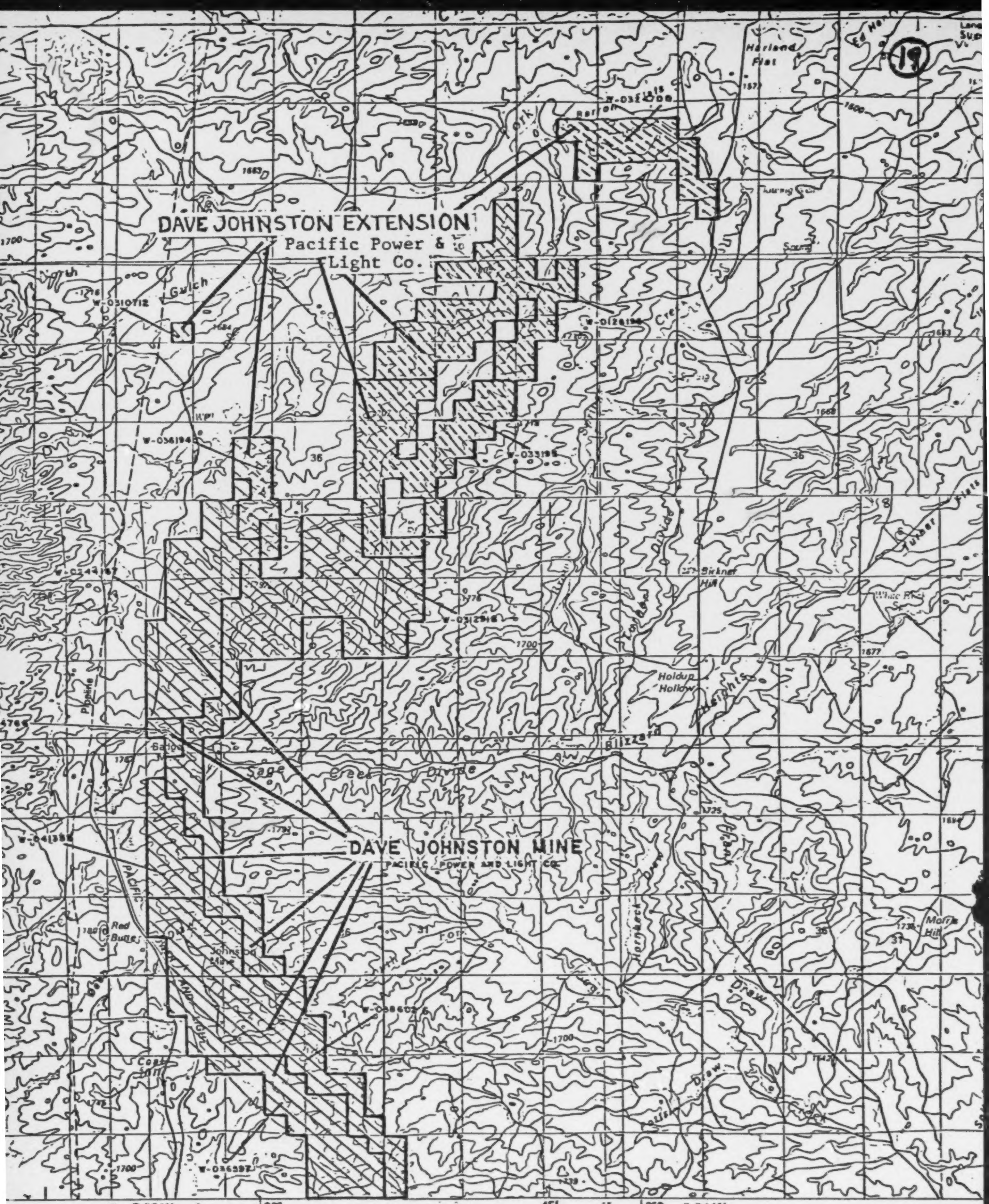

DAVE JOHNSTON EXTENSION
Pacific Power & Light Co.
DAVE JOHNSTON MINE
PACIFIC POWER AND LIGHT CO.
W-0310712
W-0126194
W-033195
W-038602
Harland Flat
Gulch
Sage Creek Divide
Blizzard Heights
Holdup Hollow
Skinner Hill
Red Butte
Johnston Mine
Coal Hill
Morris Hill
R 75 W
R 74 W
45'

Figure II-9 - Federal leases in Dry Cheyenne and Glenrock coal fields, Wyoming

KILOMETERS 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13
MILES 1 0 1 2 3 4 5 6 7 8

federal coal is found in a checkerboard pattern, intermingled with coal owned by the Burlington Northern Railroad and the state.

Mine Statistics

Table II-3 summarizes statistics for federal mines in the basin. This data is a revision of OTA (1981, Table 57), and is based on more recent information. Table II-4 summarizes capacity, contracts, and lessees' expectations of production at developed mines, and revises OTA (1981, Table 58). Table II-5 summarizes statistics for undeveloped leases rated by OTA as having favorable development prospects. Data concerning leases with uncertain or unfavorable development prospects can be found in OTA (1981, Table 63). Table II-6 is a revision of data concerning non-federal mine development during the period 1986-1991.

Lessee reserve data is organized by economic sector in Tables II-7 and II-8. Table II-7 indicates that permitted and unpermitted leased federal, state, and fee reserves at developed mines in the Powder River basin held by major energy companies total 3.3 billion tons, more than one billion tons more than all other sectors combined. Table II-8 indicates that major energy corporations control 60 percent of the leased federal reserves in the basin. Raw data used to develop Table II-8 is confidential and not reported here.

TABLE 11-3
POWDER RIVER BASIN FEDERAL MINE STATISTICS

Mine Name	Parent Company of Lessee	Number of Federal Leases	Permitted Mine Plan Reserves (mt)	Unpermitted Leased Reserves (mt)	Permitted Mine Plan Area (acres)	Federal Lease Area (acres)	First Coal Shipped	Production (mt) 1979	Production (mt) 1980	Remaining Mine Life (years)
Montana										
Rosebud	Montana Power	5	34.8	146.9	6221	8227	1968	11.7	10.4	36
Big Sky	Peabody	1	16.8	LM[1]	2351	4307	1969	2.5	3.0	38
Spring Creek	Pacific P&L	1	184	59	3019	2347	1980	0	0.1	25
West Decker	Peter Kiewit Sons/ Pacific P&L	5	158.5	56.7[2]	3565	5401	1972	7.1	5.5	26
East Decker	Peter Kiewit Sons/ Pacific P&L	1	172.6	--	4145	9410	1978	5.9	5.7	27
Montana Totals		13	566.7	261.6+LM	19301	29692		27.2	24.7	
Wyoming										
Buckskin	Shell	1	43	36	1467	600	1981	0	0	15+
Rawhide	Exxon	1	525	90.9	7393	4978	1977	3.6	4.5	25+
Eagle Butte	AMAX	1	536	--	4304	3520	1978	3.7	8.4	28
Wyodak	Black Hills P&L	3	165.3	--	3274	1880	1922	2.4	2.5	33
Caballo	Exxon	2	463.8	150	10040	5331	1979	1.3	2.0	42+
Belle Ayr	AMAX	2	276.1	--	6918	2401	1973	15.0	15.7	20
Caballo Rojo	Mobil	2	321.4	100	5815	4000	1983	0	0	24+
Cordero	Sun	1	543	--	8232	6560	1976	3.8	6.6	25
Coal Creek	Atlantic Richfield	1	315	--	9545	5806	1982	0	0	30
Jacobs Ranch	Kerr-McGee	2	304	--	4959	4352	1978	4.7	8.2	21
Black Thunder	Atlantic Richfield	2	709	--	7660	5884	1977	6.2	10.5	35
Dave Johnston	Pacific P&L	6	91.2	--	13026	9662	1958	3.8	3.8	26+
Wyoming Totals		24	4292.8	376.9	82633	54983		44.5	62.2	
Powder River Basin Totals		37	4859.5	638.5+LM	101934	85385		71.7	86.9	

[1] LM - low to medium amount of reserves (30 million to 100 million tons)

[2] Includes minor amounts of fee coal

TABLE II-4 POWDER RIVER COAL BASIN FEDERAL MINE PRODUCTION, CAPACITY AND CONTRACTS
(millions of tons per year)

Mine name	1981 mine design Capacity	Production 1980	1986 mine design Capacity	Contracts for 1986	Lessees' estimates of Production-1986	1991 mine design Capacity	Contracts for 1991	Lessees' estimates of Production -1991
Montana								
Rosebud	14.2	10.4	19.8	17.8	17.8	19.8	18.0	18.0
Big Sky	4.6	2.9	4.6	4.6	4.6	4.6	4.6	4.6
Spring Creek	0.2	0.1	10.0**	7.0	7.0	10.0**	7.0	10.0
West Decker	10.4	5.5	10.4	5.0	8.0	10.4	5.0	8.0
East Decker	6.7	5.7	6.7	6.0	6.0	6.7	6.7	6.6
Montana Totals	36	24.6	52	40.4	43.4	52	41.3	47.2
Wyoming								
Buckskin	0	0	6.2	6.2	6.2	6.2**	6.2**	6.2**
Rawhide and Caballo	12+7	4.5+2.0	24+12	16.0	24+7	24+12	16.0	24+12
Eagle Butte and Belle Ayr	14+21	8.4+16.1	26+21*	35	24+11	26+21*	35	22+13
Wyodak	3	2.6	5	3.0	3.0	5	5.0	5.0
Caballo Rojo	0	0	9	2.6	9.0	15	2.6	15.0
Cordero	24	6.6	24	10.5	16.0	24	10.5	24.0
Coal Creek	0	0	12	4.8	9.8	12	4.8	12
Jacobs Ranch	16	8.2	16	15.6	15.6	16	15.5	15.5
Black Thunder	20.5	10.5	20.5	17.0	17.0	20.5	17.3	20.5
Dave Johnston	3.8	3.8	3.8	3.7	3.7	3.8	3.7	3.7
Wyoming Totals	121.3	62.7	180	114.4	146.3	186.	116.6	172.9
Powder River Basin Totals	157.3	87.3	220	154.8	189.7	238	157.9	220.1

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*In terms of remaining reserves, capacity is 11 mty

**Assumes that additional reserves under alluvial valley floors are permitted for mining

TABLE II-5
STATISTICS ON UNDEVELOPED FEDERAL LEASES RATED AS FAVORABLE DEVELOPMENT POTENTIAL, POWDER RIVER BASIN

Lease	Parent Company of Lessee	Number of Leases	Proposed Mine Plan Area (acres)	Federal Lease Area (acres)	Proposed Mine Plan Reserves (mt)	Proposed Mine Capacity (mty)	Proposed Mine Life (years)	Proposed Year of First Coal Shipments
Montana								
Wolf Mountain	Peter Kiewit Sons	1	--	524	S	4.0	--	--
CX Ranch	DuPont/Standard Cal.	1	1905	674	46.9	8.0	9	1985
Wyoming								
Lake DeSmet	Texaco	5	--	9417	800.5	--	--	--
Wildcat	Gulf	1	--	1571	L	10	--	--
Dry Fork	Cities Service	3	--	3580	L	15.0	--	--
South Rawhide	Exxon	1	2680	4782	195.4**	7.0	36	1984
East Gillette	Kerr-McGee	3	3246	4343	255.7	12.3	25	1984
North Rochelle	Shell	1	--	1960	197	8	26	1985
Rochelle	Peabody	2*	6859		411.5	11	38	--
North Antelope	Peabody/Panhandle Eastern	2*	3762	9141*	189.5	5	40	1985
Antelope	Pacific P&L	3	7642	4817	260.3	12	29	1983
Dave Johnston Extension	Pacific P&L	4	--	4309	S	--	--	--
		26	26094	45118	2356.8+	92.3		

*Both tracts include W0321779

S = small reserves (0 to 30 million tons)

L = large reserves (over 180 million tons)

**341.6 mt proposed for lease exchange

TABLE II-6
NON-FEDERAL MINE DEVELOPMENT IN THE POWDER RIVER BASIN, 1986-91

	1986		1991	
Likely by 1991	Capacity	Contracts	Capacity	Contracts
Montana:				
Absaloka[a]	15.0	5.1	15.0	5.1
Brophy No. 2	0.2	0	0.2	0
Montco	2.0	0	9.0 (12)[c]	0
Young's Creek	--	--	8.0	0
Coal Creek[a]	0.2	0	0.2	0
TOTALS	17.4	5.1	32.4	5.1
Wyoming				
Bighorn[a]	4.3	3.0	4.3	3.0
Dutchman	1.0	0	1.0	0
Welch No. 1	1.0	0	1.0	0
Wymo[b]	4.0	2.0	4	2.0
Fort Union[a]	1.5	0	0	0
Clovis Point[a]	5.0	0	5.0	0
TOTALS	16.8	5.0	15.3	5.0
GRAND TOTALS	34.2	10.1	47.7	10.1

[a] Producing in 1980. Total capacity of mines producing in 1980 is 23.5 million tons per year.

[b] Contracts for captive production for utilities. The capacity shown here could probably not be sustained much beyond 1991 without new leasing of federal coal.

[c] Potential capacity in the 1990s.

SOURCE: Office of Technology Assessment, 1981, Table 63, Coefield, 1981, pers. comm.; Glass, 1981, pers. comm.

TABLE II-7
RESERVES BY SECTOR OF ECONOMY AT DEVELOPED MINES, POWDER RIVER BASIN

Sector	Mine, Parent	Permitted* Reserves	Unpermitted* Reserves	Totals
Utility	Rosebud, Montana Power	34.8	145.9	
	Spring Creek, Pacific Power & Light	184	59	
	West Decker, Pacific Power & Light	79.3	28.4	
	East Decker, Pacific Power & Light	86.3	--	
	Wyodak, Black Hills Power & Light	165.3	--	
	Dave Johnston, Pacific Power & Light	91.2	--	
		640.9	233.3	874.2
Mining and Construction	Big Sky, Peabody	16.8	LM	
	West Decker, Peter Kiewit Sons	79.3	28.4	
	East Decker, Peter Kiewit Sons	86.3	--	
	Eagle Butte, AMAX	536	--	
	Belle Ayr, AMAX	276.1	--	
		994.5	28.4+LM	1022.9 +LM**
Minor Energy	Jacobs Ranch, Kerr-McGee	304	--	
		304		304
Major Energy	Buckskin, Shell	43	36	
	Rawhide, Exxon	525	90.9	
	Caballo, Exxon	463.8	150	
	Caballo Rojo, Mobil	321.4	100	
	Cordero, Sun	543	--	
	Coal Creek, Atlantic Richfield	315	--	
	Black Thunder, Atlantic Richfield	709	--	
		2920.2	376.9	3297.1

---

* Federal and non-federal coal

**Low to medium reserves (30 to 100 million tons)

TABLE II-8
POWDER RIVER BASIN
FEDERAL LEASE RECOVERABLE RESERVES*

Sector of Economy	Recoverable Reserves Held (billion tons)	Percent
Major Energy	5.4	59
Minor Energy	1.0	11
Mining and Construction	1.5	16
Utilities	1.0	11
Individuals	0.2	2
	9.1	

*Based on data from General Mining Order No. 1, Automated Coal Lease Data System, and mine plans

CHAPTER III
SUMMARY OF MINING AND RECLAMATION METHODS, AND ENVIRONMENTAL AND RECLAMATION ISSUES AFFECTING PRODUCTION

The tables included in this chapter summarize data on mining and reclamation methods, conditions affecting production, the extent of alluvial valley floor designations, and a summary of regulatory actions which have affected reserves at federal mines. Table III-1 summarizes mining methods and equipment used at Powder River basin mines. As can be seen from the table, most operations employ truck/shovel, open pit methods. Only at the northern and southern fringes of the basin are draglines used as the prime overburden-moving equipment. Stripping ratios vary, but are never greater than four. In the Gillette area, stripping ratios do not exceed three, and are as low as 1.13 at the Rawhide Mine.

Table III-2 summarizes reserves, capacities and conditions affecting production. Because alluvial valley floor considerations are a major environmental issue in the basin, data concerning regulatory determinations are summarized in Table III-3. In Table III-4, estimates are made of the status of valleys as alluvial valley floors at undeveloped leases. These estimates are based on review of U. S. Geological Survey topographic maps, regulatory decisions, and the author's knowledge of the area.

Table III-5 summarizes the tonnage of reserves affected by regulatory decisions in the basin.

TABLE III-1
SUMMARY OF MINING METHODS AND EQUIPMENT USED ON DEVELOPED LEASEBLOCKS, MONTANA AND WYOMING

Powder River Basin

Mine	Lease(s)	Lessee/Operator	Mining Method	Over-burden/ Coal Ratio	Over-burden Thickness	Number of Seams/ Coal Thickness	Overburden and Coal Removal Equipment
Rosebud	B-020989 M-073109 M-35734 M-35735 M-42381	Western Energy Co.	Surface: dragline	4	20-200'	1/23'	3 draglines, 19 dozers, 1 stripping shovel, 3 loading shovels, 6 front-end loaders, 13 haulage trucks
Big Sky	M-15965	Peabody Coal Co.	Surface: dragline	2.5	20-100'	2/25-27' 6-9'	Draglines, haulage trucks
Spring Creek	M-069728	Pacific P&L/ Spring Creek Coal Co.	Surface: Dragline truck/shovel	1.4	15-240'	1/81'	Dragline, trucks/shovels
West Decker	M-057934 M-057934-A M-061685 M-06770 M-37604	Decker Coal Co.	Surface: Dragline truck/shovel	3.3	20-300'	2/52,18.5'	3 draglines, 17 dozers, 46 haulage trucks, 9 loading shovels, 5 front-end loaders (used at East and West Decker Mines)
East Decker	M-073093	Decker Coal Co.	Surface: Truck/shovel dragline	4:1	30-400'	3/52.8'	
Buckskin	W-0325878	Shell Oil Co.	Surface: Truck/shovel	--	101'	1/104'	Scrapers, shovels (20 backhoe cu. yd.), trucks (100-ton), front-end loaders, backhoe
Rawhide	W-5036	The Carter Mining Co.	Surface: Dragline	1.13:1	111'	1/104'	Dragline: (M195 M20 yd. 3) (o,c), dozers, 1 stripping shovel (22-yard), 14 haulage trucks (o,c) (170-ton), 2 loading shovels (295BE 35-yd 3, P&H1900), 2 front-end loaders
Eagle Butte	W-0313773	AMAX Coal Co.	Surface: Truck/shovel	1.32:1	172'	1/112'	7 stripping shovels (M204) (BE295B), 70 haulage trucks (o,c), 1½ loading shovels, 2 front-end loaders

TABLE III-1 (continued)

Powder River Basin Mine	Lease(s)	Lessee/Operator	Mining Method	Over-burden/ Coal Ratio	Over-burden Thickness	Number of Seams/ Coal Thickness	Overburden and Coal Removal Equipment
Wyodak	W-11833 W-0313666 W-073289	Wyodak Resources Devt. Corp.	Surface: Truck/shovel	--	30-200'	1/70'	3 dozers, 7 haulage trucks, shovel, 2 front-end loaders
Caballo	W-3327 W-49644	Exxon Coal USA	Surface: Truck/shovel dragline	2	140'	1/67'	3 dozers, 1 stripping shovel, 8 haulage trucks, 1 loading shovel, 2 front-end loaders
Belle Ayr	W-0317682 W-72282	AMAX Coal Co.	Surface: Truck/shovel	1.5	0-260'	1/72.5'	1 dragline, 3 dozers, 5 stripping shovels, 1 bucketwheel, 38 haulage trucks, 2 loading shovels 2 front-end loaders
Caballo Rojo	W-23929 W-58112	Mobil Oil Corp.	Surface: Truck/shovel	2.6	150'	1/65'	Shovels (33-cu. yd.), haulage trucks (170-ton)
Cordero	W-8385	SUNOCO Energy Devt. Co.	Surface: Truck/shovel	2.5	160'	1/60'	Electric shovels, trucks
Coal Creek	W-3446	Atlantic Richfield/ Thunder Basin Coal Co.	Surface: Truck/shovel dragline	2.4	10-175'	2/23', 10'	2 draglines, 3 shovels (o,c), 24 haulage trucks
Jacobs Ranch	W-23928 W-24710	Kerr-McGee Coal Corp.	Surface: Truck/shovel	2	88'	1/55'	1 dragline, 6 dozers, 2 stripping shovels, 11 haulage trucks, 1 loading shovel, 2 front-end loaders
Black Thunder	W-2313	Atlantic Richfield/ Thunder Basin Coal Co.	Surface: Truck/shovel	1.9	123'	1/66'	3 stripping shovels, 6 dozers, 16 haulage trucks, 2 loading shovels, 1 front-end loader
Dave Johnston	C-054769 W-0244167 W-0312918 W-038597 W-038602 W-041355	Pacific Power & Light	Surface: Dragline Scraper/dozer Truck/electric shovels	3.03	20-140'	2/12-20' 20-38'	dragline (P752 LR), shovels (10-yd BE 1508B) 14-yd M151M), 3 dozers, 3 scrapers, 2 front-end loaders, 2 coal haul trucks

Key: o = overburden
c = coal
M = Marion

BE = Bucyrus Erie
P&H = P&H Harnischfeger
P = Page

TABLE III-2
SUMMARY OF MINE CAPACITIES AND CONDITION AFFECTING PRODUCTION FEDERAL LEASEBLOCKS, MONTANA AND WYOMING

Powder River Basin

Mine	Lease(s)	Lessee	Permitted Recoverable Reserves	Mine Life	Ultimate Design Capacity (mt/y)	Existing Design Capacity (mt/y)	1980 Production (mt)	Mining and Reclamation Conditions Affecting Production
Rosebud	B-020989 M-073109 M-35734 M-35735 M-42381	Western Energy Company	34.8	36	19.8	14.2	10.4	--Unleased coal within life-of-mine boundaries --Difficulties in permit application preparation and regulatory review --0.5 mt lost due to hydrologic concerns along East Fork Armells Creek --Detailed analysis of cumulative hydrologic impacts underway
Big Sky	M-15965	Peabody Coal Company	16.8	38	4.6	4.6	3.0	--Selective burial of interburden requirements causes rehandle by dragline
Spring Creek	M-069782	Spring Creek Coal Co.	184	25	10	10	0.1	--Alluvial valley floor studies have delayed, and may eliminate, inclusion of 59 mmt recoverable reserve in mine plan --Mining method changed to permit constant availability of non-sodic spoil for reclamation and regrading to approximate original contour
West Decker	M-057934 M-057934-A M-061685 M-06770 M-37604	Decker Coal Co.	158.5	26	10.4	10.4	5.5	--Difficulties in permit application preparation and regulatory review, North Extension application first submitted in 1975, approval expected in early 1982. --Recovery of lower seam has been required on state lease and may be required on federal leases, has delayed approval of short-term leases --Mining method changed to include truck/shovel operation for stockpiling spoil for final backfill
East Decker	M-073093	Decker Coal Co.	172.6	27	6.6	6.6	5.7	--Regulatory requirements for spoil handling necessitated changing mining method from dragline to truck/shovel, with associated increase in mining costs; 5.7 mt lost due to this decision

TABLE III-2 (con't)
SUMMARY OF MINE CAPACITIES AND CONDITION AFFECTING PRODUCTION
FEDERAL LEASEBLOCKS, MONTANA AND WYOMING

Powder River Basin

Mine	Lease(s)	Lessee	Permitted Recoverable Reserves	Mine Life	Ultimate Design Capacity (mt/y)	Existing Design Capacity (mt/y)	1980 Production (mt)	Mining and Reclamation Conditions Affecting Production
Buckskin	W-0325878	Shell Oil Co.	43	15	6.2	6.2	0	--Alluvial valley floor study and designation have delayed, and may eliminate, inclusion of 36 mt recoverable reserve in mine plan
Rawhide	W-5036	Exxon Coal	525	25	24	12	4.5	--Alluvial valley floor reclamation may be required for mining of 2 valleys --Two-pit mining sequence needed for coal blending
Eagle Butte	W-0313773	AMAX Coal Co.	536	28	26	20	8.4	--Alluvial valley floor reclamation required for mining of 1 valley
Wyodak	W-011833	Wyodak Resources Development Corp.	165.3	33	5.0	3.0	2.5	--Closed depressions will occur in reclamation landscape --Seepage into pit
Caballo	W-3397 W-49644	Exxon Coal USA	463.8	42+	12	7	2.0	--About 150 mt not proposed for recovery awaiting synthetic fuel market
Belle Ayr	W-0317682 W-72282	AMAX Coal Co.	276.1	21	21	21	15.7	--Alluvial valley floor reclamation required for continued mining of Caballo Creek
Caballo Rojo	W-23929 W-58112	Mobil Oil Co.	321.4	24+	15	9	0	--Company presently negotiating for legal right to mine 120 acres of fee coal within lease --About 100 mt yet to be proposed for recovery
Cordero	W-8395	SUNOCO Energy Development Co.	543	25	24	24	6.6	--Alluvial valley floor reclamation required
Coal Creek	W-3446	Atlantic Richfield Co.	315	30	12	12	0	--Alluvial valley floor studies have delayed approval of mining 1 valley

TABLE III-2 (con't)
SUMMARY OF MINE CAPACITIES AND CONDITION AFFECTING PRODUCTION
FEDERAL LEASEBLOCKS, MONTANA AND WYOMING

Powder River Basin

Mine	Lease(s)	Lessee	Permitted Recoverable Reserves	Mine Life	Ultimate Design Capacity (mt/y)	Existing Design Capacity (mt/y)	1980 Production (mt)	Mining and Reclamation Conditions Affecting Production
Jacobs Ranch	W-23928 W-24710	Kerr-McGee Coal Corp.	304	21	16	16	8.2	No major issues
Black Thunder	W-2313 W-36094	Thunder Basin Coal Co.	709	35	20.5	20.5	10.9	--Alluvial valley floor reclamation required for continued mining; additional 10 mt outside lease could be recovered if approved
Dave Johnston	C-054769 W-038602 W-041355 W-038597 W-0244167 W-0312918	Pacific Power and Light	91.2	26	3.8	3.8	3.8	--Delayed highwall reduction may not be approved by regulatory authorities

TABLE III-3. ALLUVIAL VALLEY FLOOR SUMMARY TABLE, DEVELOPED FEDERAL MINES, POWDER RIVER BASIN

Mine	Permitted Area	Stream	Status	Area	Reserves Affected (mt)
Rosebud	6221	East Fork Armells Creek	No	-0-	-0-
Big Sky	2351	Emile Coulee	No	-0-	-0-
		Miller Coulee	No	-0-	-0-
		Lee Coulee[1]	Potential/uncertain	275[1]	--
Spring Creek	3019 (4466)[2]	Spring Creek	No	-0-	
		South Fork Spring Creek	Yes	290[3] (1592)[4]	59[4]
West Decker	3565	Pond Creek	No	-0-	-0-
		Pearson Creek	No	-0-	-0-
		Spring Creek	No	-0-	-0-
East Decker	4145	Deer Creek	Potential/uncertain	390	-0-[5]
Buckskin	1467	Spring Draw	Yes }	358[6]	36[6]
		Rawhide Creek	Yes }		
Rawhide[9]	7393	Rawhide Creek	Yes }	200 (940)[4]	90.9[4]
		Little Rawhide Creek	Yes }		
Eagle Butte[9]	4304	Little Rawhide Creek	Yes }	140	20
		Dry Fork Powder River	Potential/likely }		
Wyodak[9]	3274	Donkey Creek	No	-0-	-0-
Caballo	10040	Tisdale Creek	No	-0-	-0-
		North Tisdale Creek	No	-0-	-0-
		Gold Mine Draw	Potential/unlikely	-0-	-0-
Belle Ayr[9]	6918	Caballo Creek	Potential/likely }	370	50
		Tisdale Creek	Yes }		
Caballo Rojo	5815	--	None	-0-	-0-
Cordero[9]	8232	Belle Fourche River	Potential/unlikely	-0-	-0-
Coal Creek	9545				
		East Fork Coal Creek	Yes	350	20
		Middle Fork Coal Creek	No	-0-	
Jacobs Ranch[9]	4959	Burning Coal Draw	Potential/unlikely	-0-	-0-
		North Prong Little Thunder Creek	Potential/unlikely	-0-	-0- -0-

(continued)

TABLE III-3 (continued)

Mine	Permitted Area	Stream	Status	Area	Reserves Affected (mt)
Black Thunder[9]	7660	North Prong Little Thunder Creek	Potential/unlikely	-0-	-0-
		Little Thunder Creek	Potential/unlikely	-0-	-0-
Dave Johnston[9]	13026	--	None	-0-	-0-
				2373	293.4

Notes:

[1] Not within presently permitted area

[2] Total permit and amendment area

[3] Within presently permitted and proposed amendment areas

[4] Total area beyond designated alluvial valley floors as well as alluvial valley floors not to be recovered unless alluvial valley floor reclamation approved

[9] "Grandfathered" mines, mining must be approved if essential hydrologic functions of alluvial valley floor can be restored

[5] Regulatory actions to prohibit spoil disposal in valley have resulted in 17.5 mt not recovered; action not related to alluvial valley floor issue

[6] Although OSM has determined areas to be not sigificant to farming, Wyoming DEQ has not yet concurred

TABLE III-4. ALLUVIAL VALLEY FLOOR (AVF) SUMMARY TABLE
UNDEVELOPED FEDERAL COAL LEASES, POWDER RIVER BASIN

Lease block	Lease block area (acres)	Acres of designated AVF significant to farming	Acres of designated AVF not significant to farming	Acres of stream valley under study as potential AVF	Name of stream
CX Ranch (Consolidated Coal)	674	245	300	--[a]	Squirrel Creek
CX Ranch (Rosebud Coal Sales)	524			--	
Pearl	541	--	--	40	Little Youngs Creek
Armstrong	80	0[b]	0	0	None
Bass	20701	0	0	200	Clear Creek Powder River Deadman Creek several tributaries
Arvada	4366	0	0	750	Powder River Robinson Draw Wild Horse Creek North Prong Wild Horse Creek
Lake DeSmet	9417	0	0	10[c]	Boxelder Creek and Tributary
Belco	4551	0	0	240	Negio and Dry Creek
Wildcat	1571	--	--	120	Jamison Prong and Soukup Draw
Blue Diamond	40	--	--	0	None
Dry Fork	3580	--	--	300	Dry Fork Little Powder River Prairie Creek
South Rawhide	4782	--	0	--	None

(continued)

TABLE III-4 (continued)

Lease block	Lease block area (acres)	Acres of designated AVF significant to farming	Acres of designated AVF not significant to farming	Acres of stream valley under study as potential AVF	Name of stream
East Gillette	4343	--	0	--	None
Federal		--	--	--	
Gulf (3)	756	--	--	--	None
East Wyodak	2560	--	--	25	Lee Draw
North Rochelle	2000	--	--	0	None
Rochelle and North Antelope	9141	--	--	120	Porcupine Creek and Tributay Holmes Creek West Fork Creek Tributaries
Antelope	4817	--	480	--	Antelope Creek West Logan Draw Spring Creek
Phillips Creek (1), (2)	4079	--	--	60	Phillips Creek Dry Fork Cheyenne River
TOTALS: Federal Lease Acres	78523	245	780	1065	

[a] --: Indicates no determination made

[b] 0: Indicates determination by regulatory agency that no AVFs are along indicated streams

[c] There is an estimated 400 million tons of non-federal coal under a potential alluvial valley floor associated with this lease block

Adapted from Office of Technology Assessment, 1981

TABLE III-5

SUMMARY OF IMPACTS TO RECOVERABLE RESERVES AT FEDERAL MINES FROM ENVIRONMENTAL AND RECLAMATION CONSIDERATIONS, POWDER RIVER BASIN

Issue Area	Mine	Reserves Affected (mt)	Effect
Water Resources			
Designated alluvial valley floor, not significant to farming, delays in development and approval of mine plan awaiting adequate reclamation plan submittal	Spring Creek Buckskin Coal Creek	59	May be mined if reclamation approved
Designated alluvial valley floor, significant to farming, prohibited from mining	CX Ranch/Wolf Mountain		Will not be recovered
Requirement to not intercept alluvial aquifer of stream valley, determined to not be an alluvial valley floor	Rosebud	0.5	Will not be recovered
Requirement to not spoil into stream valley	East Decker	5.7	Will not be recovered
Designated alluvial valley floors, mines operating prior to passage of PL 95-87, mining permitted if reclamation plan is approved	Rawhide Eagle Butte Belle Ayr	90.9 20 50	Will be mined under strict reclamation standards
Potential alluvial valley floors in undeveloped leaseblocks	11 leaseblocks	140.4	Most will be mined under strict reclamation standards
Complexity of developing reclamation plan for large stream valley, necessity of controlling large design floods, designated alluvial valley floor, not significant to farming	Antelope	37.5	May be proposed at a later time
Wildlife Resources			
Eagle nest in mine area	Rosebud	1.6	No prohibition if nest can be moved
Air Resources			
Existing air quality permit for 11 mty and anticipated peak production 18.2 mty; mine in TSP nonattainment area, approval considered likely	Rosebud	Maximum effect 7.2 mty/ 89.4	Approval expected but not assured

CHAPTER IV

DESCRIPTIONS AND STATISTICS FOR FEDERAL MINES, POWDER RIVER BASIN

Mine Name: Rosebud Mine

Lease Number(s): B-020989, M-073109, M-35734, M-35735, M-42381

Location: Rosebud County, Montana

Lessee: Western Energy Company (Montana Power Company)

Operator: Western Energy Company

Proximity to Other Operations: Two miles north of Big Sky Mine

First Coal Shipped: 1920s

1979 Production: 11.7 mt

1980 Production: 10.4 mt

Ultimate Mine Design Capacity: 19.8 mty

Remaining Mine Life: 36 + years

Mining Method: Dragline

Recovery Rate: 94%

Permitted Mine Plan Area: 6221.4 acres

Federal Lease Area Associated with Mine Plan: 8226.6 acres

Pending Actions: Three amendment applications would expand permitted area to 13,400 acres.

Coal Data

Seam Name(s): Rosebud

Thickness (ft): 23

Rank: Subbituminous

BTU/lb: 8600

Sulfur (%): 0.8

Overburden Thickness: 20-200 feet

Overburden/Coal Ratio: 4:1

Reserves:

Total recoverable permitted mine plan (mt): 34.8

Total recoverable permitted federal in mine plan (mt): 21.6

Total recoverable federal in leaseblock: 167.5

Notes:

Significant amounts of unleased federal coal exist within the extended mine plan area. Company officials attribute this situation to the untimely freeze on leasing of coal which was instituted in the early 1970s. If presently scheduled lease sales in 1982 are not processed at that time, Western Energy officials estimate that some portions of the 153 million tons of applied-for coal will be bypassed. Mine plans would have to be revised and permit applications resubmitted. Both actions would delay orderly progression of the mining operation at Colstrip.

This situation has created difficulties in mine planning and in the timely preparation and regulatory review of permit applications. Western Energy has also had difficulty developing permit applications which meet new regulatory standards. Delays in leasing and permitting, along with poor company planning, led to one "crisis situation" where employees were laid off and operations halted temporarily, awaiting permit approval.

Revegetation success is considered comparable with success elsewhere in Montana, although problems have developed in one mine area.

Potential adverse hydrologic impacts may limit some future mining due to the cumulative effect of mining. Ground water contamination from spoil leachates, disruption of East Fork Armells Creek by proposed mining, and disruption of agricultural water supplies are significant issues currently under review which may affect future permitting.

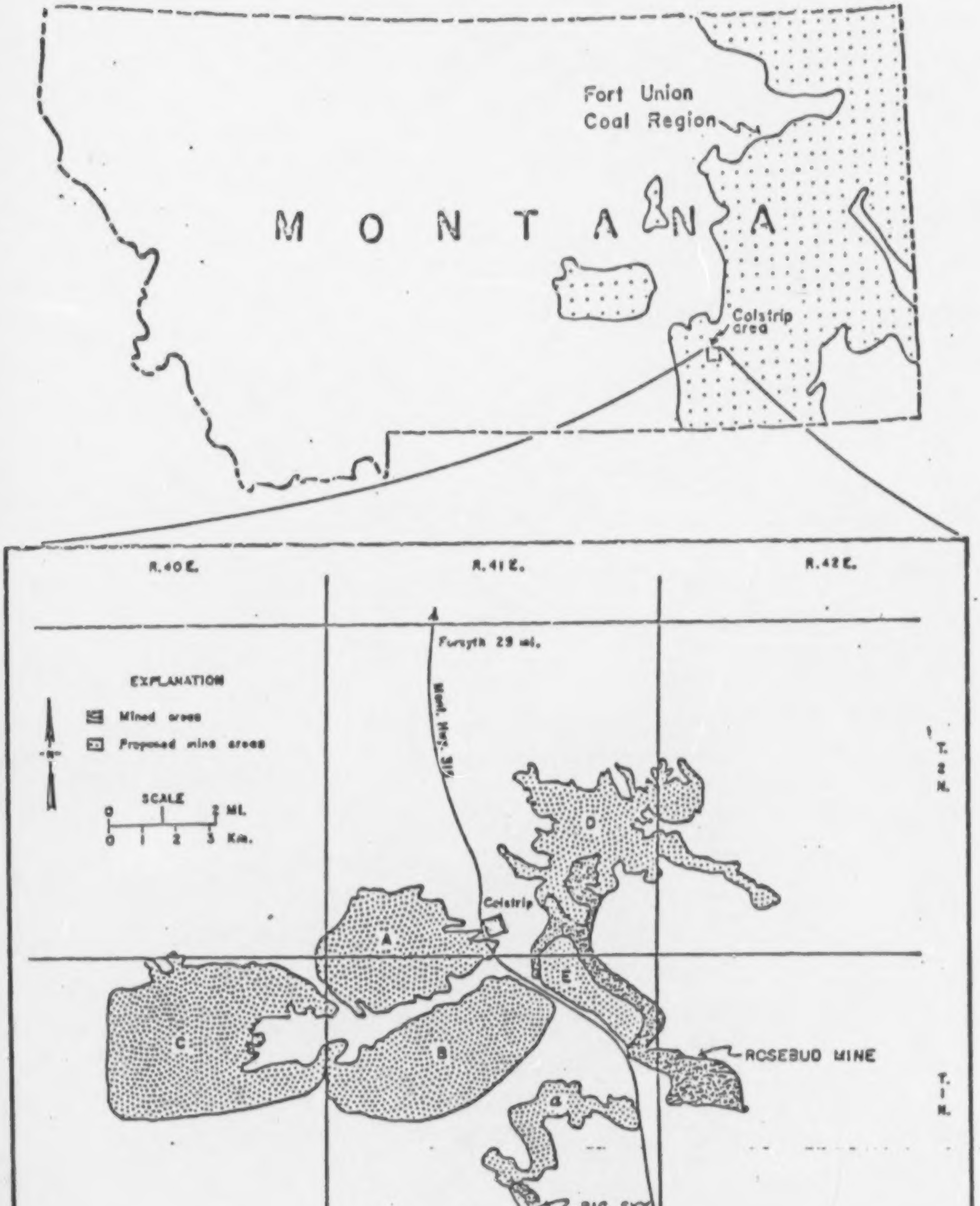
Acreage may be deleted from the Area C mine area in order to preserve an existing eagle nest.

The McKay coal seam is not recovered at the Rosebud Mine although Peabody Coal Company recovers the same seam under similar conditions at the adjoining Big Sky Mine.

A comprehensive environmental impact statement is now being prepared on life-of-mine operations at Colstrip. The most important issue being reviewed is the cumulative hydrologic impact of the mine.

Location of Rosebud Mine

(Van Voast, et al, 1977, fig.1)


Fort Union
Coal Region
MONTANA
Colstrip
area
R.40 E.
R.41 E.
R.42 E.
Forsyth 29 mi.
Mont. Hwy. 315
EXPLANATION
Mined areas
Proposed mine areas
N
SCALE
0 2 MI.
0 1 2 3 Km.
T. 2 N.
T. 1 N.
Colstrip
A
B
C
D
E
G
ROSEBUD MINE
BIG SKY
MINE
Lame Deer 15 mi.

-Locations of Colstrip, mined areas, and proposed mine areas.

ROSEBUD MINE

The Rosebud Mine is located in Rosebud County, Montana, adjacent to the town of Colstrip. For management purposes, the different existing and future Rosebud Mine areas have been divided into Areas A, B, C, D, E, F, and Pit 6. Coal mining began in the Colstrip area in the 1920s when the Northern Pacific Railroad began removing coal for rail fuel purposes. Mining of domestic and rail coal continued until 1958. In 1959, Montana Power Company acquired Northern Pacific's interest in the area and resumed production in 1968.

Five federal coal leases are held by the Western Energy Company, a wholly-owned subsidiary of the Montana Power Company. These leases total 8226 acres. Federal coal is intermixed and developed jointly with reserves owned by the Burlington Northern Railroad and the State of Montana. Currently, 6221 acres are under permit for mining and associated disturbances. Coal is produced at Areas B and E. A permit was issued in December, 1980 for the resumption of mining in Area B. An application for mining additional area (2005 acres) in Area B was submitted in January, 1981. A permit application was submitted in September, 1981 for an expansion of Area A (2573 acres) to allow resumption of mining in that area, since the existing permitted acreage in Area A has been mined out. Mining has ceased at Pit 6; the area has been fully developed. An initial permit application for mining at Area C (2877 acres) was submitted in May, 1981. The timing of development at Area D is uncertain but is expected to begin after cessation of mining at Area E. (D. Hemmer, 1980, pers. comm.) Ultimately, mining may affect an area 17 miles in length and 7 miles in width. (Western Energy Company, 1980, Exhibit F)

Currently, production at Area E is sold directly to Colstrip Generating Units 1 and 2 or is exported. Production at Areas A and B is or will be exported. Production at Area C will be sold to Colstrip Generating Units 3 and 4, while production at Area D will go to Units 1 and 2 after full development of Area E reserves is completed. (D. Hemmer, 1980, pers. comm.)

Significant reserves of federal coal within the exterior boundaries of Western Energy Company's existing and proposed mining areas are still unleased. The most critical of these coal reserves are expected to be placed for competitive bid in 1982, with other reserves placed for sale in 1984. Unleased coal of greatest importance to Western Energy lies in Areas C and D. There is at present no leased coal in Area D. Without leasing of federal coal, complete recovery of the leased fee reserves in Areas C and D will not be possible. The economic feasibility of mining the areas will have to be carefully considered and logical mining units will be difficult to develop. Other important unleased reserves are found in Areas A and B. The company has noted the probability that unleased reserves will be bypassed if leasing timetables slip beyond 1982. (Neil, 1980) In total, Western Energy Company hopes to gain an additional 153 million tons of in-place Rosebud seam reserves during the 1982 lease sales. (Shea, 1980)

Leased federal coal is scattered across a wide area, while unleased coal sometimes adjoins active operations. Western Energy has already received three short-term leases to permit continued operations at Areas A, B and E. Discussions with company officials indicate that the company had applied in 1971 for all unleased federal coal in the Colstrip area to allow integration with leased federal and fee coal into an economical mining block. The subsequent freeze on federal coal leasing left Western Energy with significant unleased reserves within their mining blocks. (Neil, 1980)

Difficulties in obtaining federal coal have been matched by difficulty in obtaining mining and reclamation permits from federal and state agencies. Life-of-mine planning has been nearly impossible at the Rosebud Mine since mine plans may only be submitted for coal already under lease. Since Western Energy expects, but does not now have, access to unleased coal, the company has not been able to submit a life-of-mine plan. Instead, the company has incrementally permitted relatively small areas, each covering a few years of future mining in a specific area. During the last few years, regulatory standards have changed with passage of PL95-87, and Western Energy has had trouble developing permit applications which meet those new standards. The resulting delays, in part the result of poor company planning and delays in leasing, and in part the result of changing regulatory standards, have resulted in a situation where miners were laid off and operations temporarily curtailed, awaiting new permit approvals. For example, in 1980 production was anticipated at 12.2 million tons, but was actually 10.4 million tons. The shortfall is attributed in part to regulatory delays. However, decline in electrical energy consumption rates among Western Energy's customers also led to the situation where only 10.4 million tons was actually needed. (Neil, 1980) Western Energy may not receive its desired permit approval for Area C at their desired time of May, 1982 due to the length of the regulatory review period and initial inadequacies in the permit document.

Physical Environment

Van Voast et al. (1977) have described the physiography and hydrology of the Colstrip area:

> The climate of the Colstrip area can be classified as semiarid. From 1941 through 1970, the average annual precipitation was 15.79 inches (U. S. Weather Bureau, 1973), of which about 60 percent fell during the growing season (May through September). Average annual temperature for those years was 45.9°F. Most of the land surface is characterized by gentle slopes and subdued drainage divides; steep slopes and narrow ridges are present in the uplands in the western part of the area. The highest land-surface altitude (about 4,800 feet) occurs along the western drainage divide of East Fork Armells Creek; the lowest altitude is about 3,000 feet and occurs along Rosebud Creek at the northeastern corner of the project area. Most mining will occur in the drainage basin of East Fork Armells Creek, which drains directly to the Yellowstone River approximately 30 miles north of Colstrip. Other drainages are tributary to Rosebud Creek, which also flows to the Yellowstone. Small areas have no apparent external surface drainage; these are the northern and southern ends of the Rosebud Mine where natural drainages were obstructed by mining activities and were not restored when mining was completed.
>
> Most streams flow only during periods of snowmelt and after infrequent events of high-intensity rainfall. Rosebud Creek and East Fork Armells Creek downstream from Colstrip have perennial flow generated by continuous groundwater discharge. Downstream from the project area, parts of the Armells Creek valley are reportedly "waterlogged" because of a high water table. Upstream from Colstrip, East Fork Armells Creek is generally dry except for waterholes where its channel locally penetrates the water table. (Van Voast et al., 1977, p. 4)

Except for those stream valleys filled with alluvium, the existing and proposed Western Energy mining areas are entirely underlain by the Tongue River member of the Fort Union formation (Fig. 1). The Tongue River member is generally composed of calcareous sandstone and siltstone, as well as shaly siltstone, carbonaceous shale, and numerous coal beds. In the Colstrip area, the member is 445 feet thick (Fig. 2). Structurally, the area lies in the northeast flank of a broad, shallow, northwest-trending syncline or synclinal trough which plunges southeastward. Structural gradients of the Rosebud coal trend mostly southward and are greatest west of Colstrip, where they may exceed 100 feet per mile. (Van Voast et al., 1977) Generally, dips are from 15 to 75 feet per mile. (Western Energy Company, 1978)

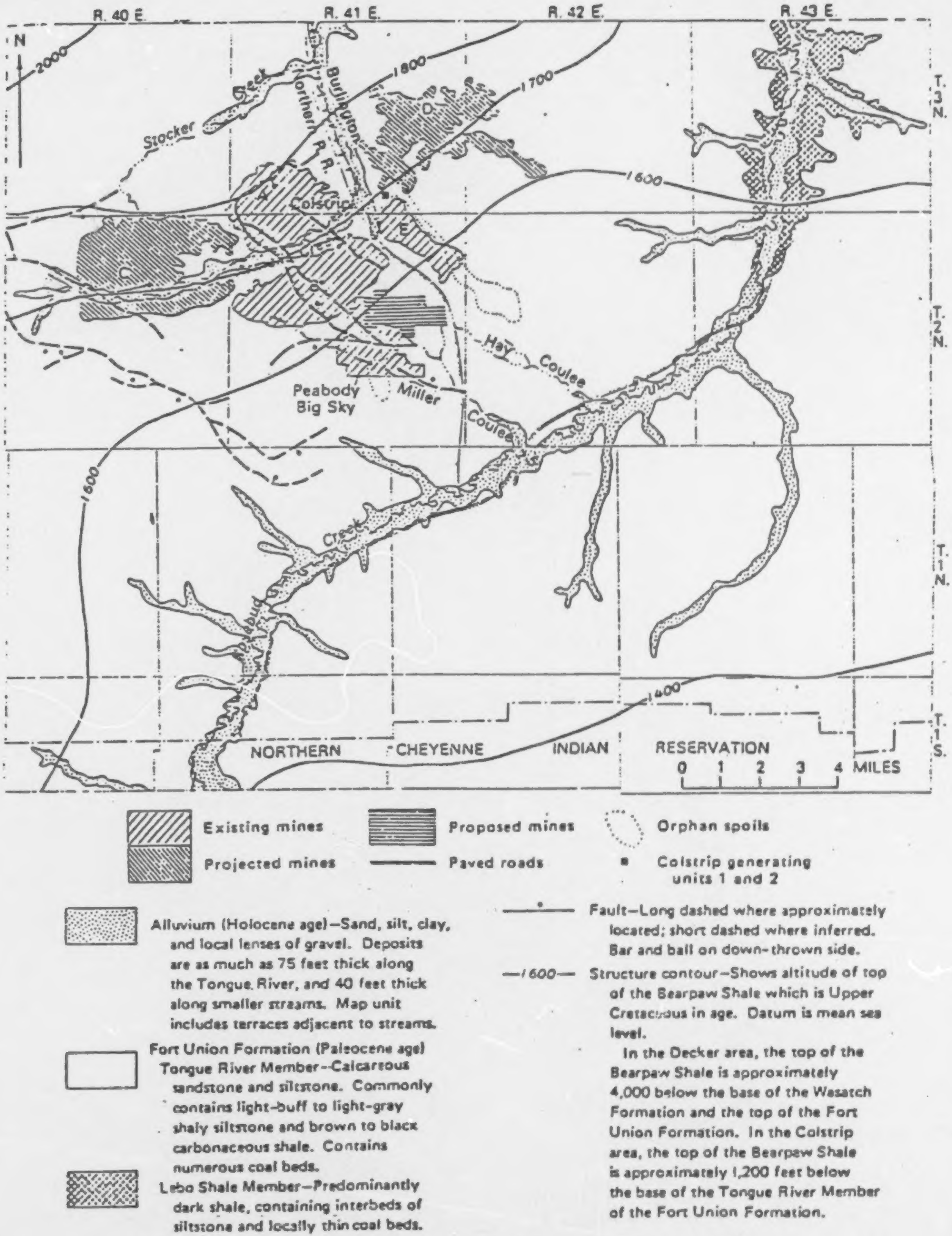

R. 40 E.
R. 41 E.
R. 42 E.
R. 43 E.
N
2000
1800
1700
1600
1400
Stocker Creek
Burlington Northern R.R.
Colstrip
C
D
E
Peabody Big Sky
Hay Coulee
Miller Coulee
Rosebud Creek
T. 3 N.
T. 2 N.
T. 1 N.
T. 1 S.
NORTHERN CHEYENNE INDIAN RESERVATION
0 1 2 3 4 MILES
Existing mines
Projected mines
Proposed mines
Paved roads
Orphan spoils
Colstrip generating units 1 and 2
Alluvium (Holocene age)—Sand, silt, clay, and local lenses of gravel. Deposits are as much as 75 feet thick along the Tongue River, and 40 feet thick along smaller streams. Map unit includes terraces adjacent to streams.
Fort Union Formation (Paleocene age)
Tongue River Member--Calcareous sandstone and siltstone. Commonly contains light-buff to light-gray shaly siltstone and brown to black carbonaceous shale. Contains numerous coal beds.
Lebo Shale Member—Predominantly dark shale, containing interbeds of siltstone and locally thin coal beds.
Fault—Long dashed where approximately located; short dashed where inferred. Bar and ball on down-thrown side.
—1600— Structure contour—Shows altitude of top of the Bearpaw Shale which is Upper Cretaceous in age. Datum is mean sea level.
In the Decker area, the top of the Bearpaw Shale is approximately 4,000 below the base of the Wasatch Formation and the top of the Fort Union Formation. In the Colstrip area, the top of the Bearpaw Shale is approximately 1,200 feet below the base of the Tongue River Member of the Fort Union Formation.

Figure 1 --Geology of the Colstrip subregion. Source: Lewis and Roberts, 1978.

(US Geological Survey and Montana Department of State Lands, 1979, fig. II-3)

47

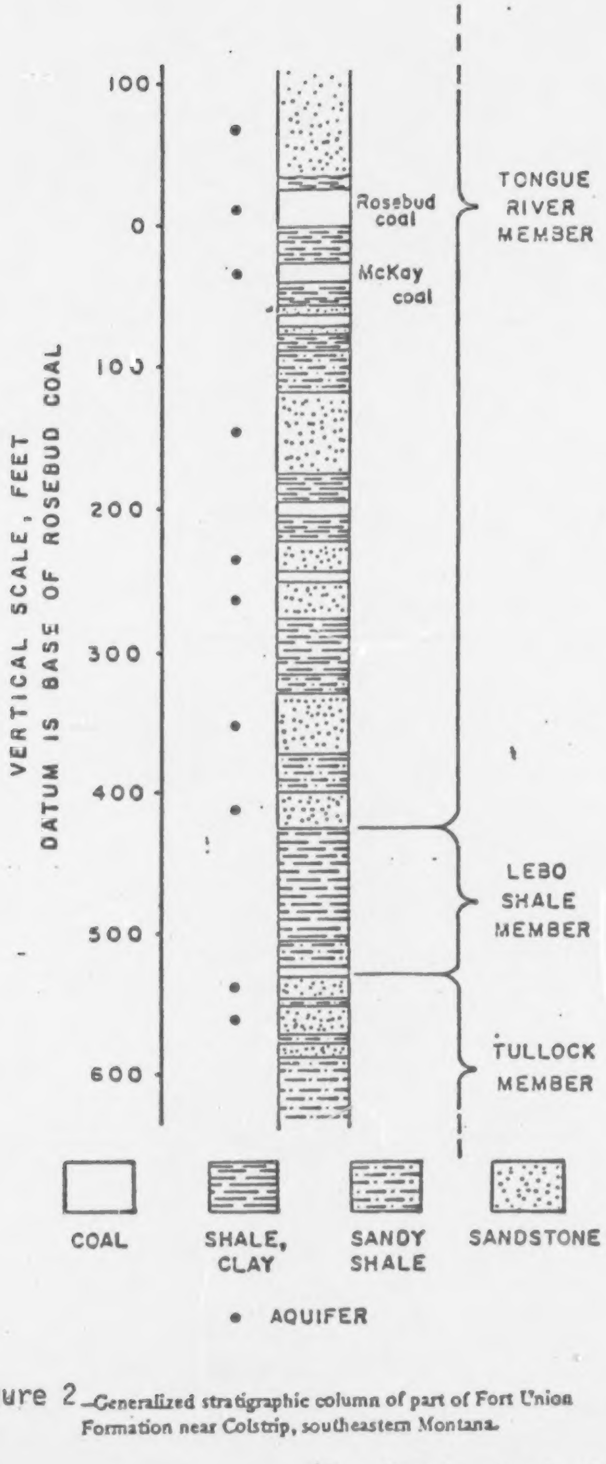

VERTICAL SCALE, FEET
DATUM IS BASE OF ROSEBUD COAL
100
0
100
200
300
400
500
600
Rosebud coal
McKay coal
TONGUE RIVER MEMBER
LEBO SHALE MEMBER
TULLOCK MEMBER
COAL
SHALE, CLAY
SANDY SHALE
SANDSTONE
● AQUIFER

Figure 2—Generalized stratigraphic column of part of Fort Union Formation near Colstrip, southeastern Montana.

(Van Voast et al, 1977, fig.4)

Mining and Reclamation: Methods and Issues

Revegetation success of current reclamation efforts at the Rosebud Mine are "as good as anywhere." (N. Harrington, 1980, pers. comm.) Revegetation at Pit 6, however, has been unsuccessful despite reseeding efforts. That area has consequently experienced some significant erosion. Steep regraded slopes and poor topsoil salvage also contribute to the erosion and poor revegetation. Soil materials are generally well suited for revegetation. At Area B, overburden textures generally range from loamy sand to clay. Lithologic and chemical properties of overburden are variable. Molybdenum, cadmium, zinc, salt, and clay have been found to exceed Department of State Lands suspect levels in some areas. (Montana Department of State Lands, 1980) However, the burial or mixing of overburden which might cause reclamation problems has not hindered revegetation success.

Van Voast et al. (1977) have made predictions about the projected impacts of continued mining at the Rosebud Mine. They anticipate little impact to groundwater flow patterns, except at Area C, where

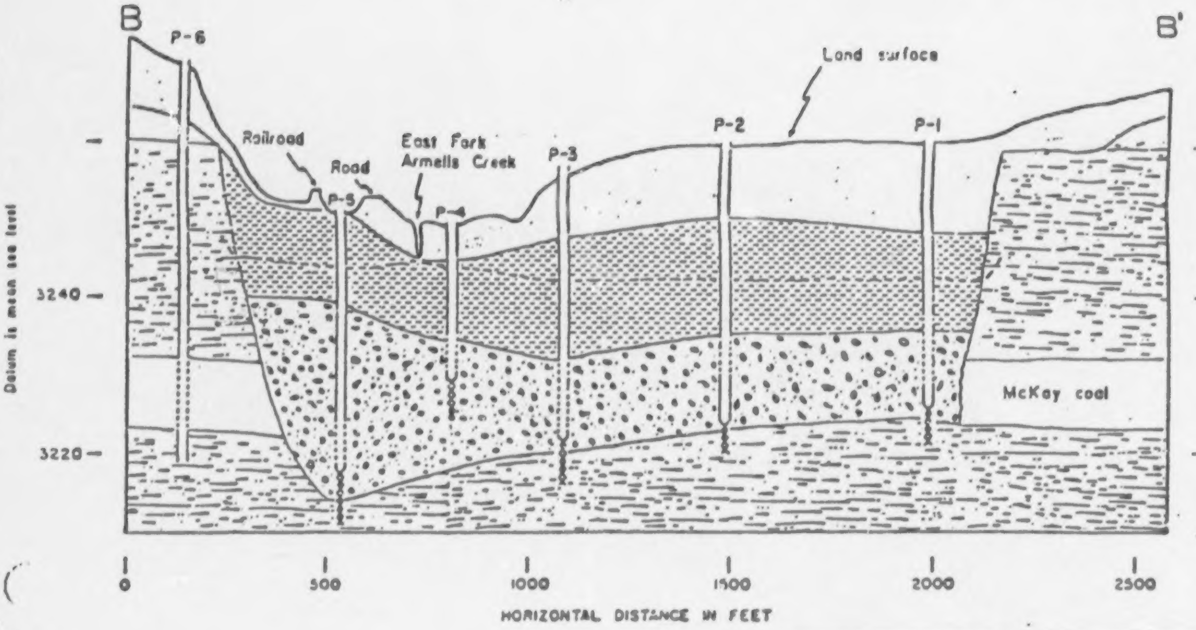
> . . . significant inflow to mine cuts will . . . be induced from groundwater storage. The intercepted and induced flows cannot be estimated without some concept of pit locations and geometries. Most waters influent to mine cuts in area C would presumably be pumped into East Fork Armells Creek downstream from the mine and would either leave the area as streamflow or would reenter the groundwater system by way of the alluvium. When mining is completed, the resultant groundwater system will depend greatly upon the location and treatment of alluvium in the spoils. If gravel has been replaced in pre-mining locations without mixing with fine-grained materials, and if it is in good hydraulic connection with undisturbed gravel, the flow system will not have changed greatly. If hydraulic conductivity of the alluvium is decreased significantly, an abnormally high water table will become established within and upstream from the mined area. (Van Voast et al., 1977, p. 39)

Further concern has been raised concerning the disruption of agricultural water supplies (wells and springs) in the total projected mine area. The most important hydrologic issue to arise at the Rosebud Mine is the impact of mining at Areas A, B, and C on the alluvial groundwater system of East Fork Armells Creek (Fig. 3). Although East Fork is not an alluvial valley floor, the Rosebud Mine's ability to mine close to the alluvium may be limited, since such mining might drain alluvial ground waters. Regulatory authorities required Area B mine cuts to be moved southeastward, away from the edge of the valley fill. The company claims 0.5 mt of coal were lost because of this action. Similarly, mining at Area C may be limited because a portion of Area C includes the East Fork valley itself. Water quality of the alluvium and stream may be degraded by mine spoil leachate.

An eagle nest in a sandstone bluff in Area C will probably not be allowed to be mined by the Montana regulatory authority. Approximately 40 acres underlain by fee coal might be deleted from the mine plan for this reason. (Blazicevich, 1981)

Selective placement of overburden could be required to improve the quality of spoil leachates and reduce the impacts of off-site groundwater contamination. A comprehensive study of hydrologic impacts of existing and future mining in Colstrip is currently in progress. No further permit decisions will be made by the Montana Department of State Lands until this study is completed.

It is notable that the Rosebud Mine recovers only the Rosebud coal seam, while the Big Sky Mine (Peabody) recovers both the Rosebud and the underlying McKay seam. The quality and stripping depth of the McKay seam are similar at both mines. Western Energy maintains that there is no market for the McKay seam, due to high sulfur, iron, and sodium concentrations in the coal.


B
P-6
B'
Land surface
Railroad
Road
East Fork Armells Creek
P-5
P-4
P-3
P-2
P-1
McKay coal
3260
3240
3220
Datum is mean sea level
0
500
1000
1500
2000
2500
HORIZONTAL DISTANCE IN FEET

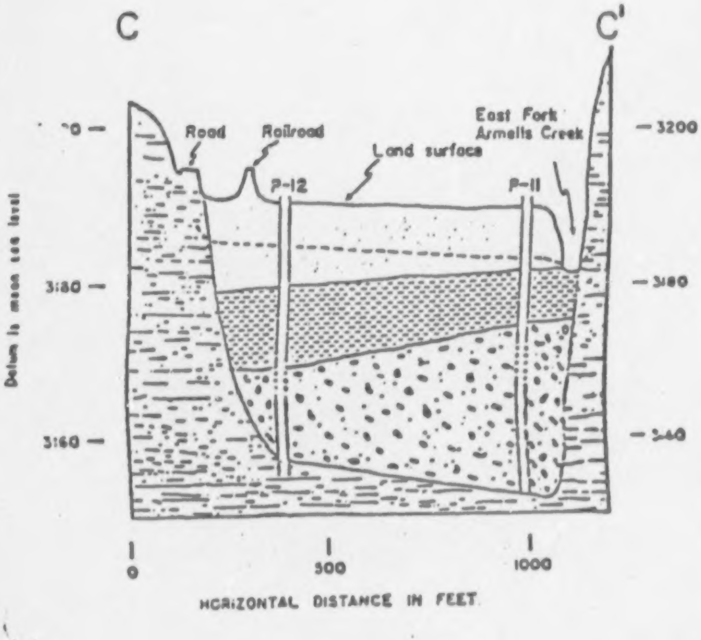
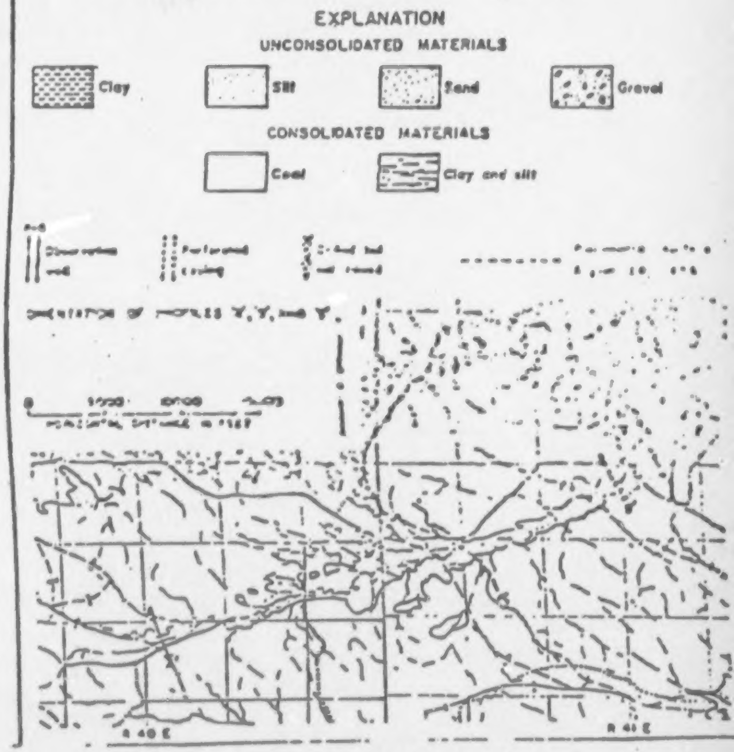

C
C'
Road
Railroad
Land surface
East Fork Armells Creek
P-12
P-11
3200
3180
3160
Datum is mean sea level
0
500
1000
HORIZONTAL DISTANCE IN FEET

Figure 3
HYDROGEOLOGIC PROFILES ACROSS EAST FORK ARMELLS CREEK NEAR COLSTRIP, SOUTHEASTERN MONTANA
(Van Voast, et al. 1977. fig.)


EXPLANATION
UNCONSOLIDATED MATERIALS
Clay
Silt
Sand
Gravel
CONSOLIDATED MATERIALS
Coal
Clay and silt
Observation well
Perforated casing
R 40 E
R 41 E

An official from Peabody Coal said that the power plant which Peabody supplies is specially equipped to handle coal from the McKay seam. (Davis, 1980)

REFERENCES

Blazicevich, Theresa. 1981. Personal communication: wildlife biologist, Montana Department of State Lands, interview, December 22.

Davis, H. 1980. Personal communication: Peabody Coal director western mine operations, telephone interview with D. Canete, November.

Harrington, Neil. 1980. Personal communication: soil scientist, Montana Department of State Lands, interview, August 27.

Hemmer, Dennis. 1980. Personal communication: Chief, Coal and Uranium Bureau, Montana Department of State Lands, interview, August 27.

Montana Department of State Lands. 1980. Draft environmental impact statement, Western Energy Company's Rosebud Mine, Area B extension: Helena, February.

----------. 1977. Final environmental impact statement for the proposed expansion of Western Energy Company's Rosebud Mine into Areas A and E: Helena, September 6, 236 p.

----------. 1976. Final environmental impact statement for the proposed expansion of Western Energy Company's Rosebud Mine into Area B: Helena, July 26.

Neil, Art. 1980. Personal communication: Vice President, Western Energy Company, telephone interview, November 17.

U. S. Geological Survey and Montana Department of State Lands. 1979. Draft environmental statement, regional analysis, Northern Powder River Basin coal, Montana.

U. S. Weather Bureau. 1973. Climatological data, Montana: annual summary.

Van Voast, Wayne A.; Hedges, Robert B.; and McDermott, John J. 1977. Hydrogeologic conditions and projections related to mining near Colstrip, southeastern Montana: Montana Bureau of Mines and Geology Bulletin 102, 43 p.

Western Energy Company. 1980. Surface mining permit consolidation and compliance statement, Rosebud Mine, Colstrip, Montana: June 1, 1 vol.

----------. 1979. Application for amendment to Surface Mining Permit No. 77003-A001, Area E, Section 2, mining extension: November 16, 3 vol.

----------. 1978. Application for amendment to Surface Mining Permit No. 76003-A002, Area B mining extension: August 4, 3 vol.

----------. 1976. Application for amendment to Surface Mining Permit No. 76003, Area A: December 17, 1 vol.

----------. 1981. Application for amendment to Surface Mining Permit No. 77003, Area A, mine expansion.

----------. 1981. Application for amendment to Surface Mining Permit No. 80003, Area B, mine expansion.

----------. 1981. Application for a surface mining permit, Area C, Block 1.

----------. 1981. Comprehensive mine plan, Rosebud Mine, Colstrip, Montana, mine areas A, B, C, D, E, and Pit 6.

STATE: Montana **REGION:** Powder River **COUNTY:** Rosebud

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
Rosebud	Western Energy (Montana Power)	B020989	1446.4 a	1N41E2, 4, 12 1N42E 18 2N41E34	5/5/1923	$1/a	$.15/ton	producing
		M073109	5792.1a	1N39E2 1N40E, 2, 10, 12, 14 1N41E 6, 8, 18 2N38E 12, 24 2N39E 28, 30, 32, 34 2N40E 20, 28	9/1/1966	$1/a	$.20/ton	
		M35734	480a	1N41E10	3/1/1979	$3/a	21%	
		M35735	447.0	1N41E2	8/1/1979	$3/a	21%	
		M42381	61.2a	1N41E6	6/1/1980	$3/a	12½%	

LEASE REFERENCE INDEX

STATE: Montana **REGION:** Powder River **COUNTY:** Rosebud

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
				surface ownership of federal leases				
Rosebud	Western Energy	B020989 M073109 M 35734 M 35735 M42381	6221.4 a. proposals to expand to 13400a.	40a	8186a	dragline	producing	19.8 mty

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE: 37.0 mt

RECOVERABLE: 34.8 mt

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

8 state leases, fee coal (Burlington Northern)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Montana REGION: Powder River COUNTY: Rosebud

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	
Rosebud	Western Energy Co	5	DATE MINE OPENED: 1968 PROJECTED CLOSING DATE: 2017 + REMAINING MINE LIFE: 36+

REMAINING RECOVERABLE RESERVES: (includes unpermitted)
FEDERAL: 162.5 mt
NON-FEDERAL: 241.4 mt

MINE DESIGN CAPACITY[1]: 19.8
RECOVERY RATE: 94%

CUMULATIVE PRODUCTION TO 1979: 112.2 (68.2 since 19
1979 ACTUAL PRODUCTION: 11.7mt

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	10.4		all contracted
1981	10.6		
1982	11.2		
1983	12.0		
1984	14.5		
1985	16.7		
1986	17.8		
1987	18.2		
1988	18.0		
1989	18.0		
1990	18.0		
~~Post 1990~~ 1991-1996	18.0 mty		

NOTES:

1997-2002	10.0mty
2003-2017	8.5 mty

[1] 1981 capacity is 14.2mty

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Montana REGION: Powder River COUNTY: Rosebud

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
Rosebud	Western Energy Co.	5	dragline

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM
SEAM NAME	Rosebud							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	23							
BTU/LB	8600							
SULFUR (%)	0.8							
ASH (%)	9							
MOISTURE (%)	25							
FIXED CARBON (%)	—							
VOLATILE (%)	—							
SEAM DEPTH	20-200							
IN-PLACE RESERVES	37.0							
RECOVERABLE RESERVES	34.8							
RECOVERY RATE	94%							

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	21.6	13.2	34.8	
	SURFACE	21.6	13.2	34.8	
	UNDERGROUND	0	0	0	

NOTES: total life-of-mine leased reserves are 408.8mt (total), 167.5 (federal); company desires leasing an additional 153mt in 1982 from federal government

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Big Sky Mine

Location: Rosebud County, Montana

Lease Number(s): M-15965

Lessee: Peabody Coal Company

Operator: Peabody Coal Company

Proximity to Other Operations: Two miles south of Rosebud Mine

First Coal Shipped: 1969

1979 Production: 2.5 mt

1980 Production: 3.0 mt

Ultimate Mine Design Capacity: 4.6 mty

Remaining Mine Life: 38 years

Mining Method: Dragline

Recovery Rate:

Permitted Mine Plan Area: 2,351.3 acres

Federal Lease Area Associated with Mine Plan: 4,306.6 acres

Pending Actions: None

Coal Data

Seam Name(s): Rosebud, McKay

Thickness (ft): 25-27 ft (Rosebud)
6-9 ft (McKay)

Rank: Subbituminous

BTU/lb: 8,600 (Rosebud) 8,560 (McKay)

Sulfur (%): 1.15 (Rosebud) 1.99 (McKay)

Overburden Thickness: 20-100 ft (Rosebud)
5-27 ft (interburden)

Overburden/Coal Ratio: 2.5

Reserves:

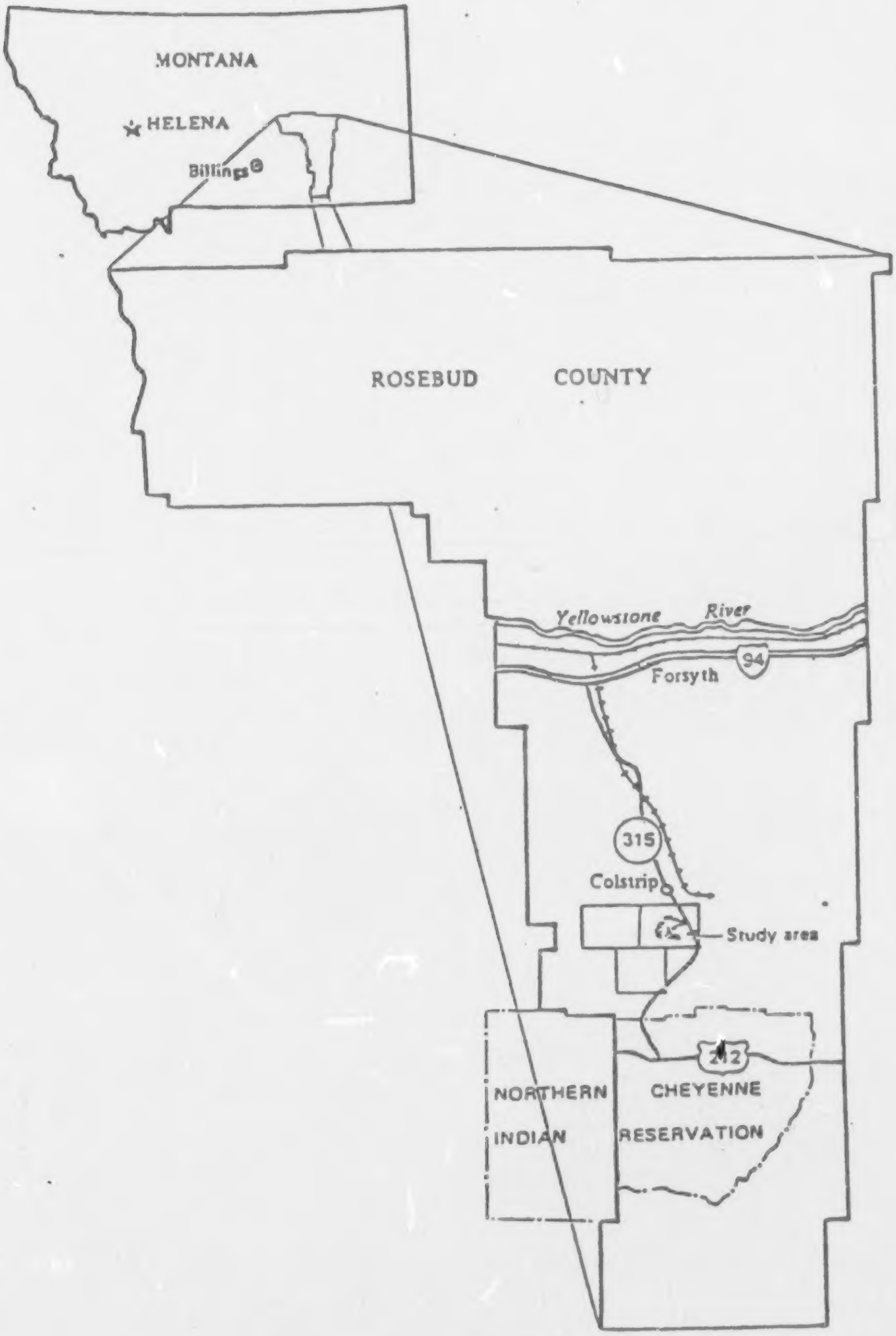
Total recoverable permitted mine plan (mt): 16.8

Total recoverable permitted federal in mine plan (mt): NA

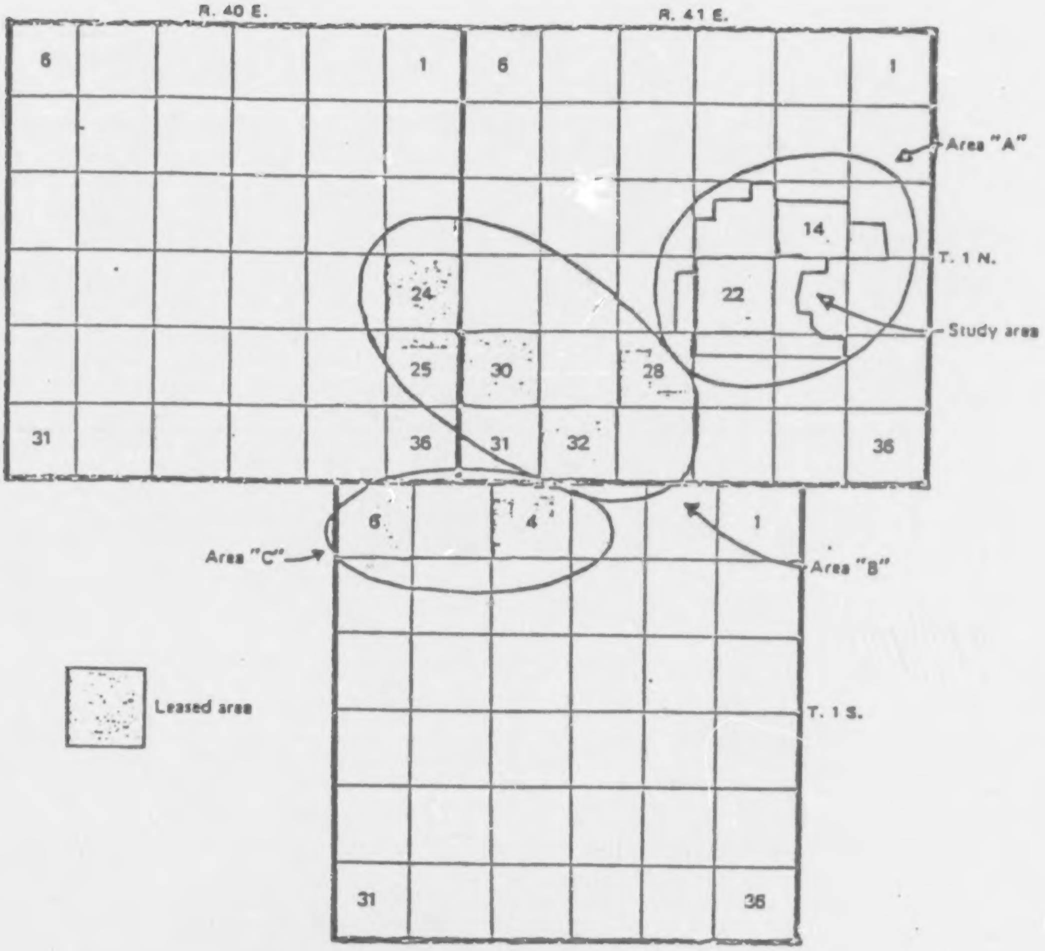
Total recoverable federal in leaseblock: NA

Notes:

Additional leased federal reserves to be proposed for mining are Area B, where mining is expected to begin in about 1985. Selective burial of the Rosebud/McKay interburden is required by the state because the interburden is characterized by high molybdenum concentrations. Alternative reclamation techniques are being proposed for some highwalls, in order to recover additional reserves, and which would result in some standing highwalls.


MONTANA
HELENA
Billings
ROSEBUD COUNTY
Yellowstone River
Forsyth
94
315
Colstrip
Study area
212
NORTHERN CHEYENNE
INDIAN RESERVATION

Index map
(Mt. DSL and USGS, 1978)


R. 40 E.
R. 41 E.
6
1
6
1
Area "A"
14
T. 1 N.
24
22
Study area
25
30
28
31
36
31
32
36
6
4
1
Area "C"
Area "B"
Leased area
T. 1 S.
31
36

Lease areas at the Big Sky mine (Federal lease M15965)
Present mining activity is entirely within area A.
(Mt. DSL and USGS, 1978)

BIG SKY MINE

Peabody Coal Company's Big Sky Mine is located south of Colstrip and south of Western Energy Company's Rosebud Mine. The Big Sky Mine was opened by Peabody Coal in 1969. Federal coal lease M-15965 was issued to Peabody on April 1, 1971. Although the entire lease covers over 4300 acres, Peabody has to date mined or formally proposed for mining only that area known as Area A. Environmental baseline studies have begun in Area B, and production is expected to begin in Area B in about 1985. (D. Hemmer, 1980)

Physical Environment

The topography of the existing permit area consists of flat-topped hills, 100-foot high cliffs, and valleys of ephemeral streams. Most stream channels are sharply incised into otherwise gently sloping valley floors. Resistant sandstone cliffs are commonly capped with clinker. Elevations in the area range from about 3650 feet along the East Fork Armells Creek/Rosebud Creek drainage divide to about 3070 feet at the confluence of Emile and Miller Coulees. The geology of the area is similar to that of the Rosebud Mine, and reference should be made to that discussion (Fig. 1).

Mining and Reclamation: Methods and Issues

Past and current mining activities have been conducted in pits oriented north/south in Area A. Newly permitted areas of Area A involve pits oriented east/west (Fig. 2). Peabody Coal Company has described the typical nature of their mining operation, which includes recovery of the Rosebud and McKay coal seams and selective burial of interburden material.

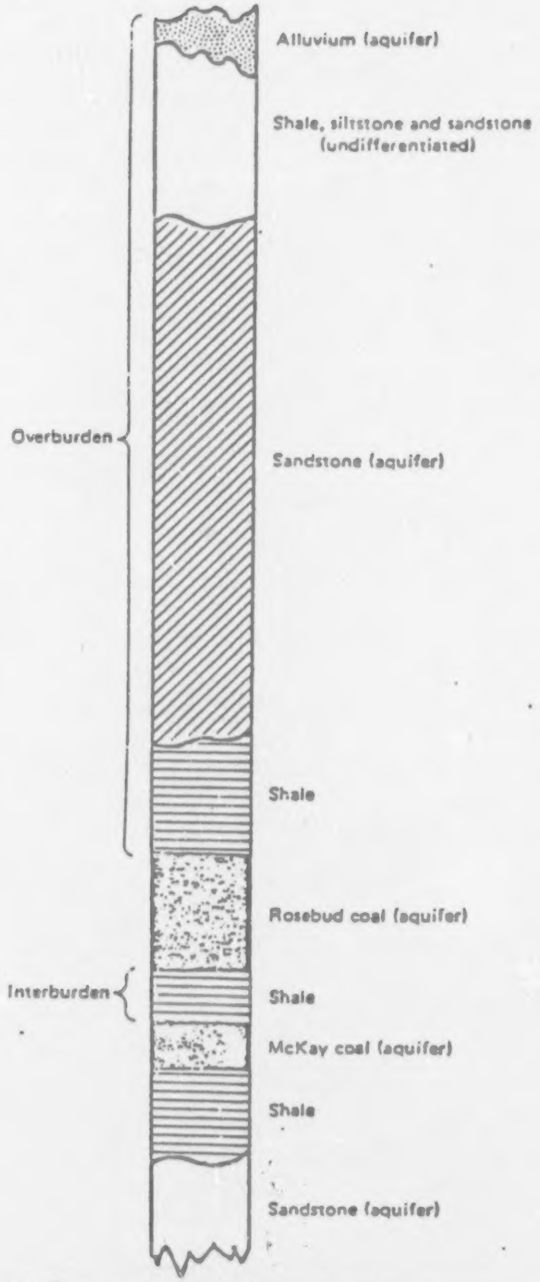

Alluvium (aquifer)
Shale, siltstone and sandstone (undifferentiated)
Overburden
Sandstone (aquifer)
Shale
Rosebud coal (aquifer)
Interburden
Shale
McKay coal (aquifer)
Shale
Sandstone (aquifer)

Figure 1. -General geologic section. Vertical scale, approximately 1"= 40 feet. All rock units vary in thickness, although the two coal beds and the interburden are relatively less variable than other units. (Mt. DSL and USGS, 1978)

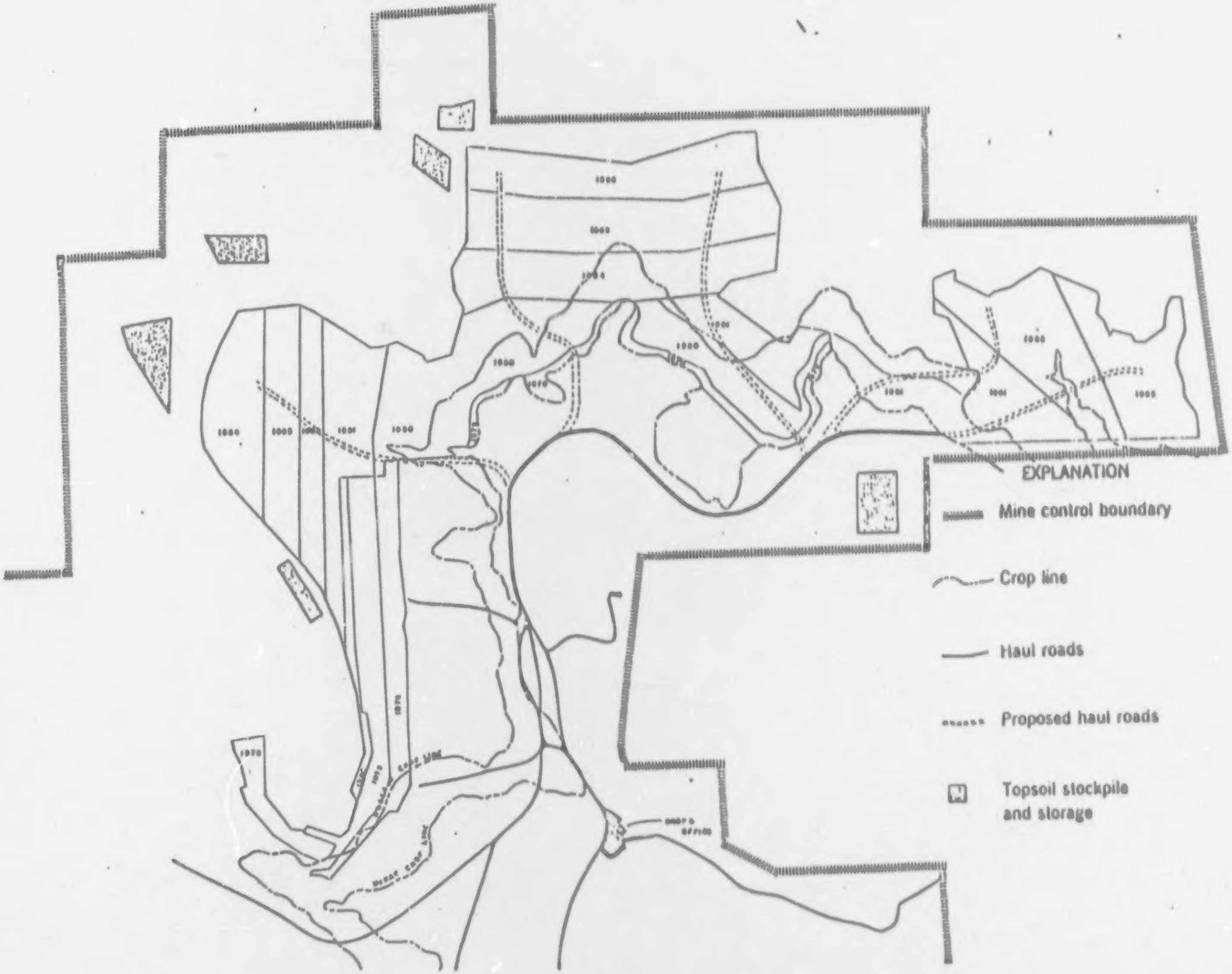

EXPLANATION
Mine control boundary
Crop line
Haul roads
Proposed haul roads
Topsoil stockpile and storage

Figure 2.—Mining sequence for Big Sky Mine, Area A
(Mt. DSL and USGS, 1979, Fig. I-1)

> A typical sequence of operations for the permit area consists of beginning removal of the overburden at the north end of the cut. . . . It should be noted that the directions north and south are typical of the present operation and that the mining sequence will also be turning in an east-west direction. After all available topsoil has been removed . . . the overburden is drilled, then broken by blasting. . . . The dragline works from the highwall and places the Rosebud overburden into the empty pit adjacent to the cut being made, progressing southward. Upon reaching the southern end of the cut, the dragline moves from the highwall onto the spoil.
>
> From this position, the dragline rehandles the Rosebud spoil placing it further to the east, creating a void adjacent to the McKay parting, in order to selectively place the gray interburden material under eight . . . feet of suitable spoil material.
>
> Upon reaching the north end of the pit, the dragline moves onto the interburden material above the McKay seam. The dragline then progresses southward in the open pit, removing the interburden and placing it in the void just created in the Rosebud spoil. The dragline then moves onto the highwall of the next cut and "deadheads" or "walks" back to the north end of the pit.
>
> The dragline works southward again, placing the Rosebud overburden in the empty pit from which the McKay seam coal has been removed. Upon reaching the south end of this cut, the dragline again moves onto the Rosebud spoil, repeating the rehandling of the Rosebud spoil as described. After mining has progressed into the coal bearing area, and three rows of overburden piles are present, intial grading will begin. . . . (Peabody Coal Company, 1979, pp. 284-285)

Peabody Coal added a third dragline at Big Sky in 1980. The company anticipates that mining at Area A will be finished in 1985. Hydrological studies for Area B have been completed, and environmental characterization studies of the area are well underway. (Davis, 1980)

Selective burial of the Rosebud/McKay interburden has been required by the Montana DSL because the interburden is characterized by high molybdenum concentrations. These high concentrations are considered potentially toxic to livestock. Such burial has been a part of the Peabody operation since at least 1975. Studies are currently underway to reevaluate elemental overburden concentrations since there is some indication that the analyses are inaccurate. Until review of new data, current selective burial practices will be continued. (N. Harrington, 1980)

Peabody is considering plans for alternate reclamation techniques of highwalls that, if approved by regulatory authorities, would increase coal recovery from currently permitted areas. Recreating cliffs in areas where they currently exist will allow economic recovery of coal from higher overburden areas. Montana regulatory authorities appear to agree with the reclamation technique for limited areas. However, some areas which Peabody is planning to propose for this type of mining and reclamation probably will not be allowed by the Montana DSL because they contain significant raptor and eagle nesting areas. (Blazicevich, 1980)

Proposed post-mining topography for Area A was significantly altered during the permit review to eliminate closed depressions created by partial filling of the final pit. Approved post-mining topography approximates the original topography because drainages will be reconstructed to be similar to pre-mining drainages and no closed depressions will be left after highwall reduction.

REFERENCES

Blazicevich, Theresa. 1981. Personal communication: wildlife biologist, Montana Department of State Lands, interview, December 22.

Davis, Hank. 1980. Personal interview: Peabody Coal Company staff, phone interview, November 26.

Harrington, Neil. 1980. Personal communication: soil scientist, Montana Department of State Lands, interview, August 27.

Montana Department of State Lands and U. S. Geological Survey. 1979. Final environmental statement, proposed expansion of mining and reclamation plan, Big Sky Mine: 1 vol.

----------. 1978. Draft environmental statement, proposed expansion of mining and reclamation plan, Big Sky Mine: 1 vol.

Nimick, David. 1980. Personal communication: hydrologist, Montana Department of State Lands, interview, August 27.

Peabody Coal Company. 1979. Mining and reclamation plan: 5 vol.

STATE: MONTANA **REGION:** POWDER RIVER **COUNTY:** ROSEBUD

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
BIG SKY MINE	PEABODY COAL COMPANY	M15965	4306.55	1N40E 24, 25 1N41E 14, 22, 28, 30, 32 1S41E 4, 6	4/1/71	$1.00/a	20¢/TON	PRODUCING

LEASE REFERENCE INDEX

STATE: MONTANA **REGION:** POWDER RIVER **COUNTY:** ROSEBUD

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
BIG SKY MINE	PEABODY	M15965	2351.31	SURFACE (LEASEBLOCK)		DRAG-LINE	APPROVED	4.6 MTY
				320	3986.55.			

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE:

SOURCE:

RECOVERABLE: 16.8

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

fee (BURLINGTON NORTHERN)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: MONTANA   REGION: POWDER RIVER   COUNTY: ROSEBUD

MINE NAME OR LEASE BLOCK: BIG SKY MINE

LESSEE(S): PEABODY COAL CO.

NUMBER OF LEASES: 1

DATE MINE OPENED: 1969

PROJECTED CLOSING DATE: 2018

REMAINING MINE LIFE: 38 YRS

REMAINING RECOVERABLE RESERVES:

FEDERAL: [redacted] [redacted]

NON-FEDERAL: [redacted] [redacted]

MINE DESIGN CAPACITY: 4.6 MTY

RECOVERY RATE:

CUMULATIVE PRODUCTION TO 1979: 18.2 MT

1979 ACTUAL PRODUCTION: 2.8 MT

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	3.0[1]		3.0[1]
1981	3.3		3.3
1982	3.6		3.6
1983	4.1		4.1
1984	4.0		4.0
1985	4.6		4.6
1986	4.6		4.6
1987	4.6		4.6
1988	4.6		4.6
1989	4.6		4.6
1990	4.6		4.6
Post 1990	4.6 MTY		4.6 MTY

NOTES:

[1] COBFIELD, 1980

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: MONTANA

REGION: POWDER RIVER

COUNTY: ROSEBUD

MINE NAME (OR LEASE BLOCK): BIG SKY MINE

LESSEE(S) (OR OPERATOR): PEABODY COAL COMPANY

NUMBER OF LEASES IN BLOCK OR PLAN: 1

MINING METHOD: DRAGLINE

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEA
SEAM NAME	ROSEBUD	MCKAY						
FORMATION	— FORT UNION —							
RANK	SUBBITUMINOUS C							
THICKNESS	25 – 27	6 – 9						
BTU/LB	8600	8560						
SULFUR (%)	1.15	1.99						
ASH (%)	9.9	8.8						
MOISTURE (%)	25.0	27.0						
FIXED CARBON (%)	35.1	35.4						
VOLATILE (%)	29.0	28.7						
SEAM DEPTH	20 – 100	5 - 17 (int.)						
IN-PLACE RESERVES								
RECOVERABLE RESERVES								
RECOVERY RATE								

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL			16.8	
	SURFACE				
	UNDERGROUND				

NOTES:

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Spring Creek Mine
Lease Number(s): M069782
Location: Big Horn County, Montana
Lessee: Spring Creek Coal Co.
(Pacific Power & Light Co.)
Operator: Spring Creek Coal Co.

Proximity to Other Operations: Five miles northwest of West Decker Mine

First Coal Shipped: 1980

1979 Production: 0
1980 Production: 0.1 mt

Ultimate Mine Design Capacity: 10 mty

Remaining Mine Life: 25 years

Mining Method: Dragline, truck/shovel
Recovery Rate: 85%

Permitted Mine Plan Area: 3019 acres

Federal Lease Area Associated with Mine Plan: 2346.8 acres

Pending Actions: Regulatory review of conceptual reclamation plan for South Fork Spring Creek alluvial valley floor

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Coal Data

Seam Name(s): Anderson/Dietz 1/Dietz 2 combined
Thickness (ft): 81
Rank: Subbituminous
BTU/lb: 9407
Sulfur (%): 0.33

Overburden Thickness: 15-240 ft
Overburden/Coal Ratio: 1.4
Reserves:
Total recoverable permitted mine plan (mt): 184
Total recoverable permitted federal in mine plan (mt): 184
Total recoverable federal in leaseblock: 243

Notes:

Fifty-nine million tons of reserves are not proposed for recovery until alluvial valley floor reclamation issues are resolved. South Fork Spring Creek has been designated an alluvial valley floor not significant to farming. A conceptual plan has been submitted for reclaiming the hydrologic functions of this valley.

Spring Creek Mine

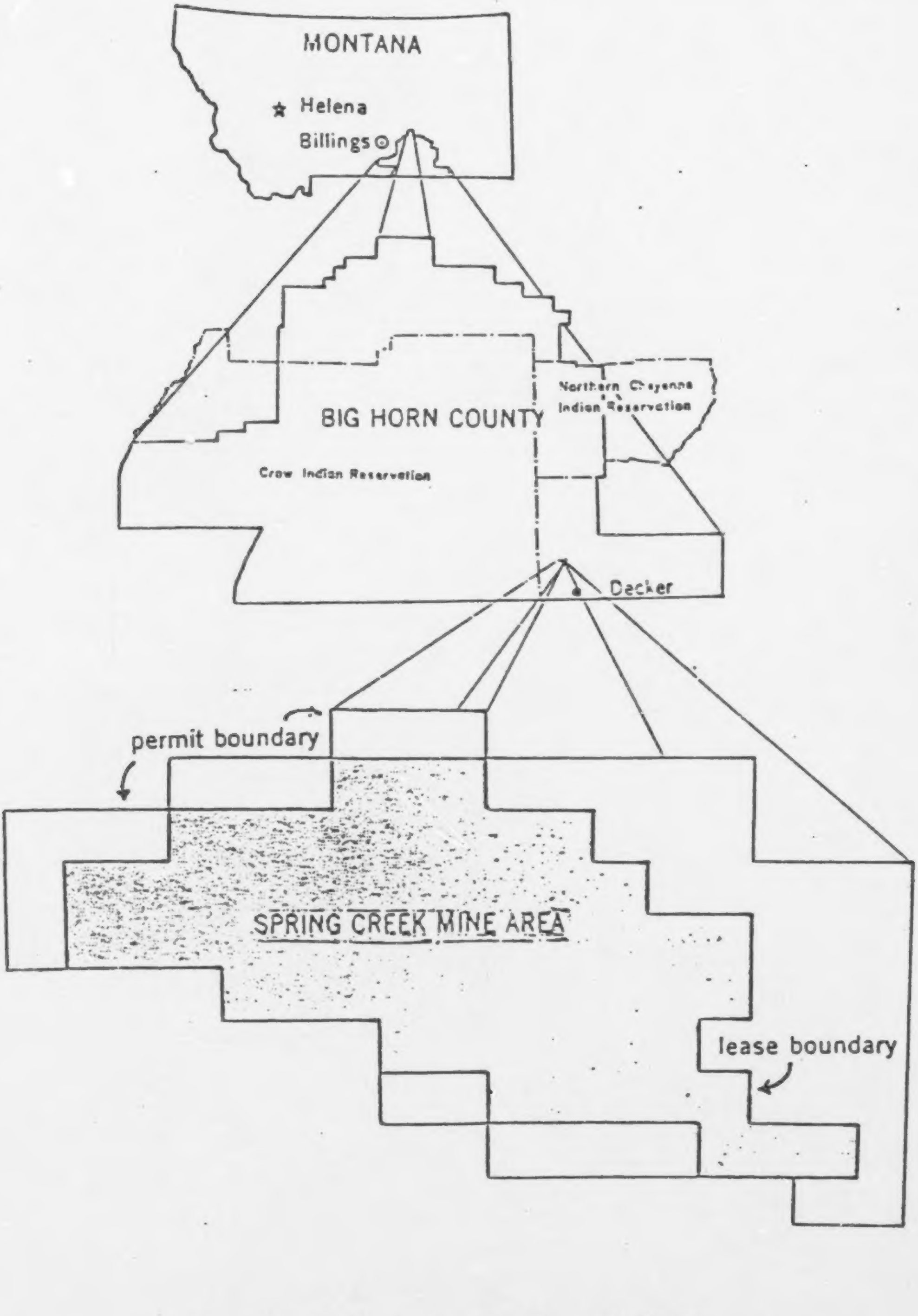
Due partially to submission of an incomplete mine plan and partially to changing regulatory issues and concerns, NERCO did not receive its mining permit until two years after submitting the Spring Creek mine plan.

At the present time, the company plans to mine only the federal reserves since reserves underlying the state and private leases are considered to be uneconomical and because the private lease is not contiguous with the rest of the leased area.

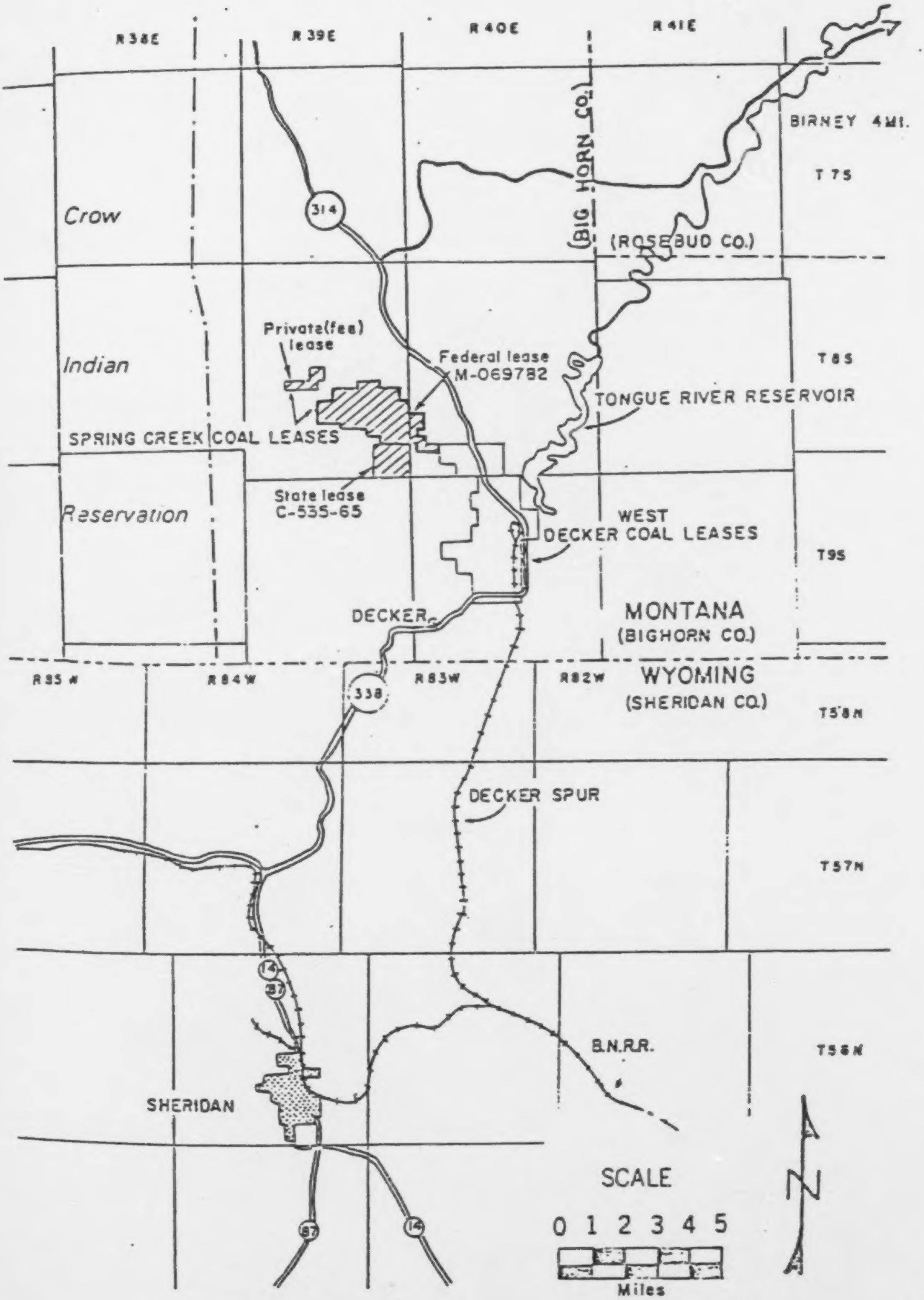
NERCO's mining methods are determined in part by the regulatory requirement that NERCO bury all sodic spoil materials under eight feet of non-sodic material.

Mine will meet diligent development requirement by 1986.

The overall wildlife impact at the Spring Creek Mine is more severe than any of the other existing or currently proposed coal strip mining operations in southeastern Montana. The destruction of habitat is considered the most important reason for these impacts.


MONTANA
Helena
Billings
BIG HORN COUNTY
Northern Cheyenne Indian Reservation
Crow Indian Reservation
Decker
permit boundary
SPRING CREEK MINE AREA
lease boundary

Index map of the Spring Creek coal field.
(USGS and Mt. DSL, 1979, fig. I-1)


R 38E
R 39E
R 40E
R 41E
BIRNEY 4 MI.
T 7S
T 8S
T 9S
Crow
Indian
Reservation
(BIG HORN CO.)
(ROSEBUD CO.)
314
Private(fee) lease
Federal lease M-069782
SPRING CREEK COAL LEASES
TONGUE RIVER RESERVOIR
State lease C-535-65
WEST DECKER COAL LEASES
DECKER
MONTANA
(BIGHORN CO.)
WYOMING
(SHERIDAN CO.)
R 85 W
R 84 W
R 83 W
R 82 W
338
T 58 N
T 57 N
T 56 N
DECKER SPUR
B.N.R.R.
14
87
SHERIDAN
SCALE
0 1 2 3 4 5
Miles
N

General location map of the Spring Creek coal leases.
(USGS and Mt. DSL, 1979, fig. I-2)

SPRING CREEK MINE

The Spring Creek Mine is operated by the Spring Creek Coal Company, a subsidiary of NERCO, Inc., in turn a subsidiary of Pacific Power and Light Company. The mine is located about six miles north of Decker, Montana. Approval of the Spring Creek Mine permit application was granted on April 11, 1979, two years after submittal of NERCO's initial application. The mine plan finally approved will result in recovery of 184 million tons of federal coal in lease M-069782, 59 million tons less than originally proposed. The additional reserves not now permitted for mining may be recovered at a later date, if it is determined that NERCO can mine the South Fork Spring Creek alluvial valley floor, a major ephemeral stream crossing the lease, and still restore the essential hydrologic functions of the valley during reclamation.

NERCO mined 118,660 tons of coal in late 1980, and planned to increase to five million tons production in 1981, and reach seven million tons in 1983. The entire seven million tons per year maximum permitted production is contracted to Houston Lighting and Power Company. Sufficient plant facilities exist at the Spring Creek Mine to produce ten million tons per year, and such a level of production may be reached if the additional 59-million-ton reserve is permitted and if the coal can be sold. If the additional reserve becomes available, NERCO would rather produce at the higher annual rate over the presently projected mine life than produce at a seven-million-ton per year rate for a period extending beyond 2006. (Larson, 1980)

Background

Spring Creek Coal Company first applied for a mining permit in April 1977, following more than one year's effort gathering environmental baseline data. The original proposal would have resulted in recovery of most of the strippable coal reserves of federal lease M-069782. On January 12, 1978 the Montana Department of State Lands responded to NERCO with a 21-page letter noting deficiencies in the application. Thereafter, according to one NERCO official, "We essentially had to start our mine planning effort all over again." (Larson, 1980) In August 1978, NERCO resubmitted a mine plan, avoiding disturbances to areas potentially meeting the criteria of alluvial valley floors under PL 95-87. When NERCO gained permit approval, it was understood by regulatory authorities that the company would conduct detailed studies to determine if South Fork Spring Creek, and main Spring Creek, also crossing the lease, actually met PL 95-87 alluvial valley floor criteria. Until those studies were completed, NERCO was not allowed to disturb any areas within 100 feet of the channel of either stream.

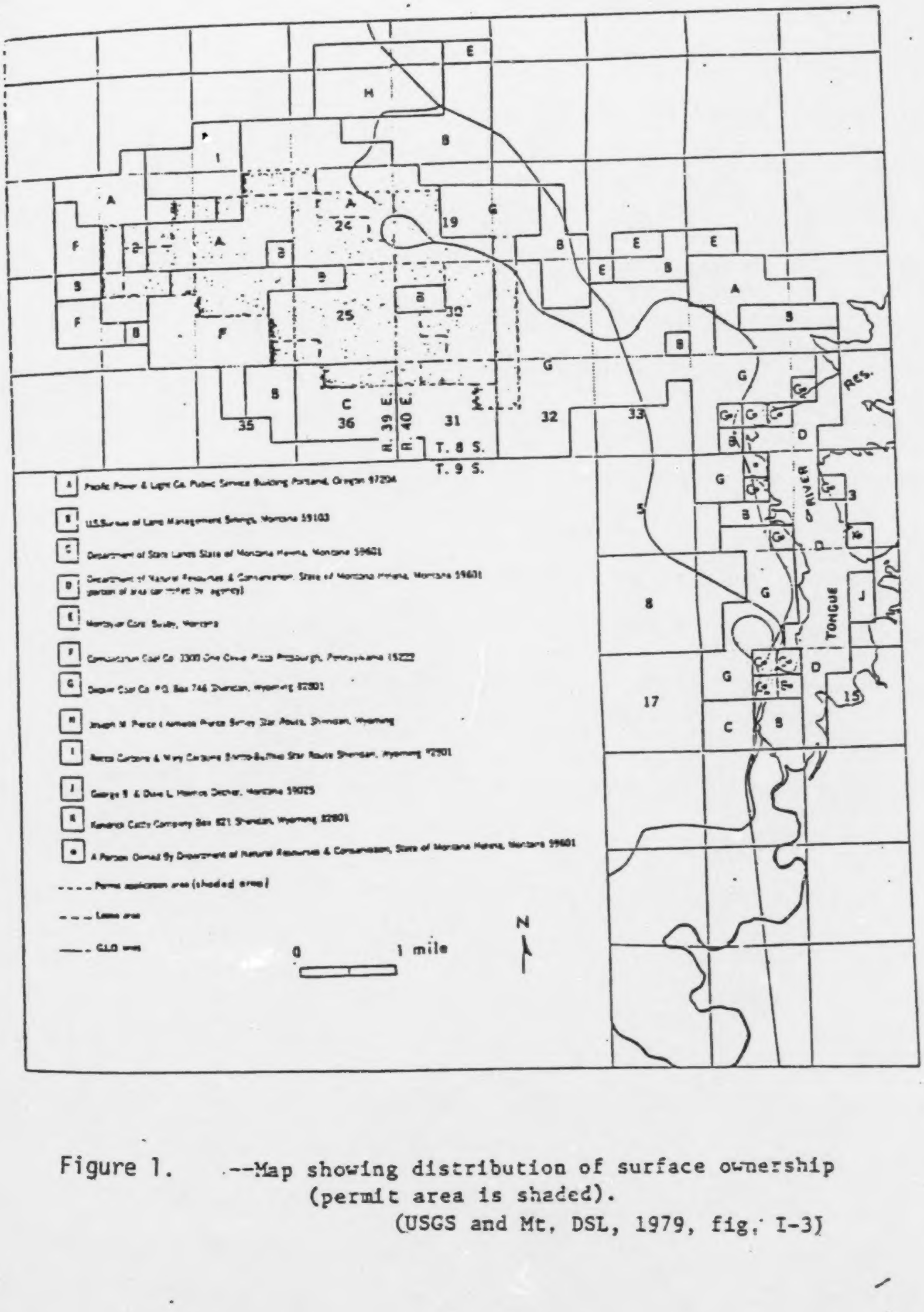
During the period since permit approval, NERCO has submitted a specific study on the two stream valleys in question, and the Montana Department of State Lands has determined that Spring Creek is not an alluvial valley floor and that South Fork Spring Creek is an alluvial valley floor which is not significant to farming. The negative determination of Spring Creek allowed NERCO to develop pits closer to the channel than had been originally allowed.

Because South Fork Spring Creek has been designated an insignificant alluvial valley floor, mining of the valley floor can be approved if NERCO can affirmatively demonstrate that the hydrologic functions of the alluvial valley floor can be restored. Reclamation of subirrigated areas, such as those found in the South Fork valley, has never before been demonstrated. Currently a conceptual plan developed by NERCO for reclamation of the hydrologic functions is under review by regulatory authorities. Other environmental issues which need to be resolved before the additional 59 mt can be permitted are (1) how the steep and precipitous uplands in the mine plan area can be reclaimed and (2) whether there is sufficient material to backfill the area to approximate original contour.

The ownership of surface and coal is diverse within the permit area. About 320 acres of surface remain totally in federal ownership, about 120 acres in state ownership, and about 3980 in private ownership. However, additional small parcels of state and federal land are crossed by the access road and rail-utility corridor (Fig. 1) and a power line of the Tongue River Electric Cooperative of Ashland.

When lands in this general area were patented, coal was retained in federal ownership under the entire permit area, except for the 120-acre tract in State Section 36. Under those patented lands where the federal government reserved only coal (about half the permit area), rights to other minerals passed to the surface owner. The present pattern of public mineral ownership in the mine area and along the transportation corridors is shown in Figure 2.

Valuable hydrocarbons other than coal (oil and gas) have been sought in this area. Between 1955 and 1968, five dry holes were drilled along an east-west line about one mile to the south of the then-proposed Spring Creek Mine. These wells were relatively shallow, the deepest reaching approximately 8300 feet below the surface. Oil and gas interest in the area is currently high; approximately 2100 acres within the permit area are under nine federal oil and gas leases. Four of these were issued between December 1, 1969 and October 1, 1976.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E
E
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A
B
G
B
C
35
36
R. 39 E.
R. 40 E.
31
T. 8 S.
T. 9 S.
32
33
G
G
RES.
D
RIVER
TONGUE
5
D
J
8
G
D
17
G
C
B
15
3
A Pacific Power & Light Co. Public Service Building Portland, Oregon 97204
B U.S. Bureau of Land Management Billings, Montana 59103
C Department of State Lands State of Montana Helena, Montana 59601
D Department of Natural Resources & Conservation. State of Montana Helena, Montana 59601 (portion of area controlled by agency)
E Montana Coal Sales, Montana
F Consolidation Coal Co. 3300 One Oliver Plaza Pittsburgh, Pennsylvania 15222
G Decker Coal Co. P.O. Box 746 Sheridan, Wyoming 82801
H Joseph M. Pierce & Armelda Pierce Smiley Star Route, Sheridan, Wyoming
I Renzo Carbone & Mary Carbone Birney Star Route Sheridan, Wyoming 82801
J George B. & Dave L. Harris Decker, Montana 59025
K Kendrick Cattle Company Box 821 Sheridan, Wyoming 82801
• A Portion Owned By Department of Natural Resources & Conservation, State of Montana Helena, Montana 59601
Permit application area (shaded area)
Lease area
GLO lines
0
1 mile
N

Figure 1. --Map showing distribution of surface ownership (permit area is shaded).
(USGS and Mt. DSL, 1979, fig. I-3)

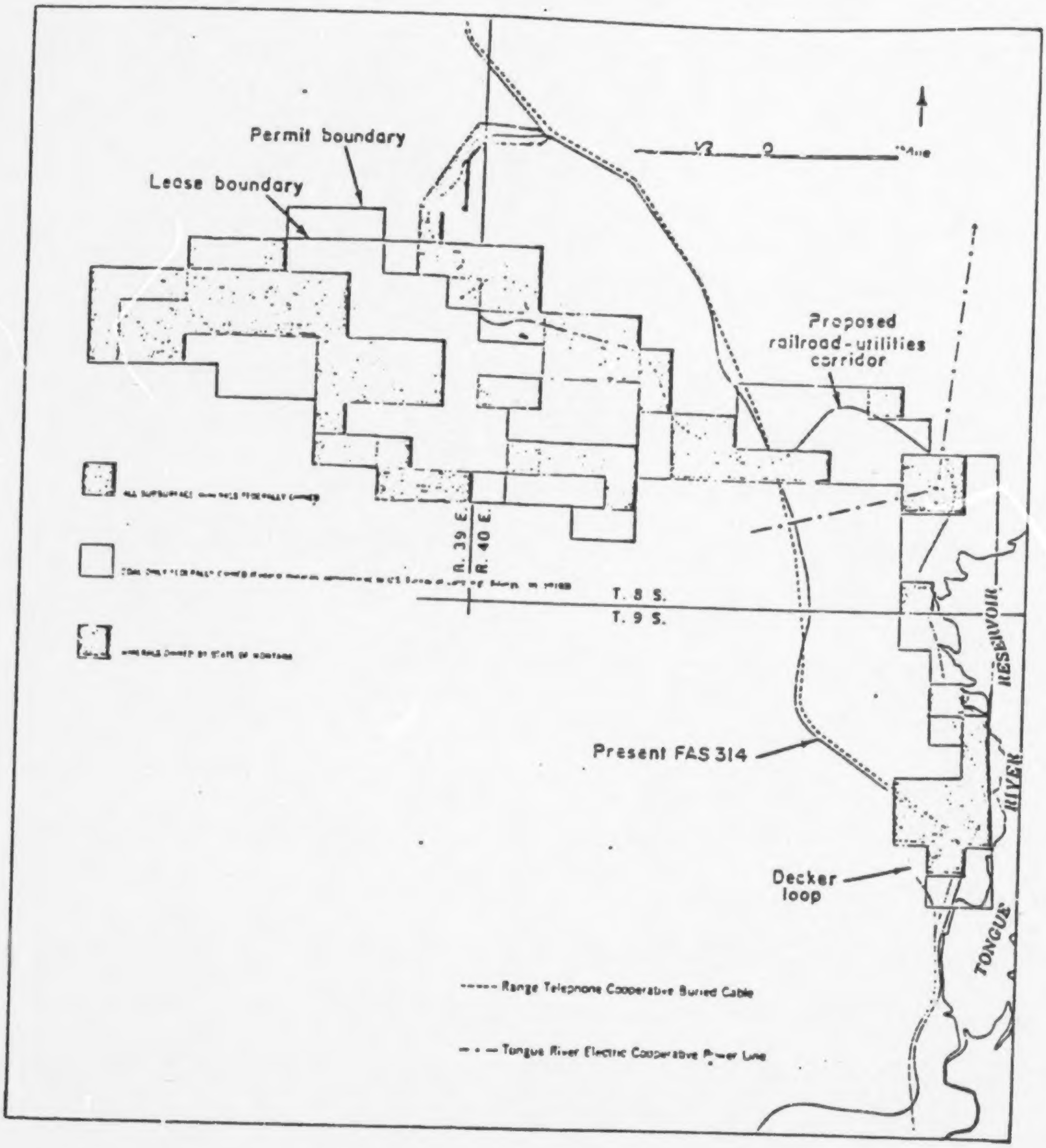

Permit boundary
Lease boundary
1/2
0
Mile
Proposed railroad-utilities corridor
R. 39 E.
R. 40 E.
T. 8 S.
T. 9 S.
ALL SUBSURFACE MINERALS FEDERALLY OWNED
MINERALS OWNED BY STATE OF MONTANA
RESERVOIR
RIVER
TONGUE
Present FAS 314
Decker loop
Range Telephone Cooperative Buried Cable
Tongue River Electric Cooperative Power Line

Figure 2. --Map showing public minerals ownership (includes coal). (USGS and Mt. DSL, 1979, fig. I-4)

The coal ownership of the Spring Creek Coal Company in Montana consists of 3,306.27 acres of coal lands under lease in the Spring Creek area. This coal is contained in three separate leases, two of which (federal and state) are contiguous. Federal lease Montana-069782 encompasses 2,346.76 acres, and is joined to the south by Montana State coal lease C-535-65, containing 640 acres. The third, a private coal lease of 320 acres, lies northwest of the other two leases and is separated from them by about 0.5 mile. (U. S. Geological Survey and Montana Department of State Lands, 1979)

Physical Environment

The topography of the Spring Creek area is typical of the northwestern Powder River Basin. The area is drained by two southeastward-flowing ephemeral streams, Spring Creek and South Fork Spring Creek. About 1.5 miles east of the permit boundary, the streams join. Total relief in the permit area is approximately 420 feet, with the highest elevation to be mined about 3,995 feet.

The Spring Creek area is a northwestward extension of the Decker coal field. Exposed rocks of the area are of the Tongue River member of the Fort Union formation, except for isolated exposures of the Wasatch formation and Recent alluvium in the stream valleys. Overburden thickness above the 81-foot thick target coal seam ranges from 15 to 240 feet.

The coal resource has been summarized in the Spring Creek Environmental Impact Statement:

> Estimates based on exploration work to date indicate that about 405 million tons of reserves in the Anderson, Dietz 1, and Dietz 2 coal seams underlie lands leased by Spring Creek Coal Co. At the present time the company plans to mine only the federal reserves. Those reserves underlying the state and private leases are considered to be uneconomical because of a greater average thickness of overburden, resulting in an unfavorable stripping ratio. Also, the private lease is not contiguous with the rest

of the leased area. Coal reserves are distributed among the leases as follows:

Federal lease Montana-069782	287 million tons
Montana State lease C-535-65	74 million tons
Scrutchfield lease (private)	44 million tons
Total reserves	405 million tons

(U. S. Geological Survey and Montana Department of State Lands, 1976, p. I-6, I-11)

Mining and Reclamation: Methods and Issues

The approved mine plan, generally known as the central field mine plan, identified both a dragline and a truck and shovel fleet to excavate overburden. The overburden-to-coal ratio for the present operations is 1.4:1. (Larson, 1980)

During the first two years of the initial 5-year permit, two boxcuts have been opened using conventional stripping and mining equipment (Fig. 3). The first boxcut, in the southwestern portion of the mine area, was excavated by a dragline. Beginning at the haulroad, the dragline stripped overburden and cast the spoil material to the north onto an area from which topsoil had been previously salvaged. Stripping proceeded toward the northwest to the western boundary of the mine area. Upon reaching the western boundary, the dragline "walked" back to the beginning of the boxcut and extended the boxcut to the southeast, again casting the spoils to the north. The southwestern boxcut has been completed during 1981.

At the same time the dragline began stripping operations in the southwestern pit, a truck and shovel fleet began stripping the top 40 feet of overburden along the northeastern boundary of the mine area. Spoil material removed by this operation was stockpiled at two locations--one to the west and one to the south. Upon completion of the boxcut in the southwest, the dragline was walked to the northeast pit via the dragline corridor.

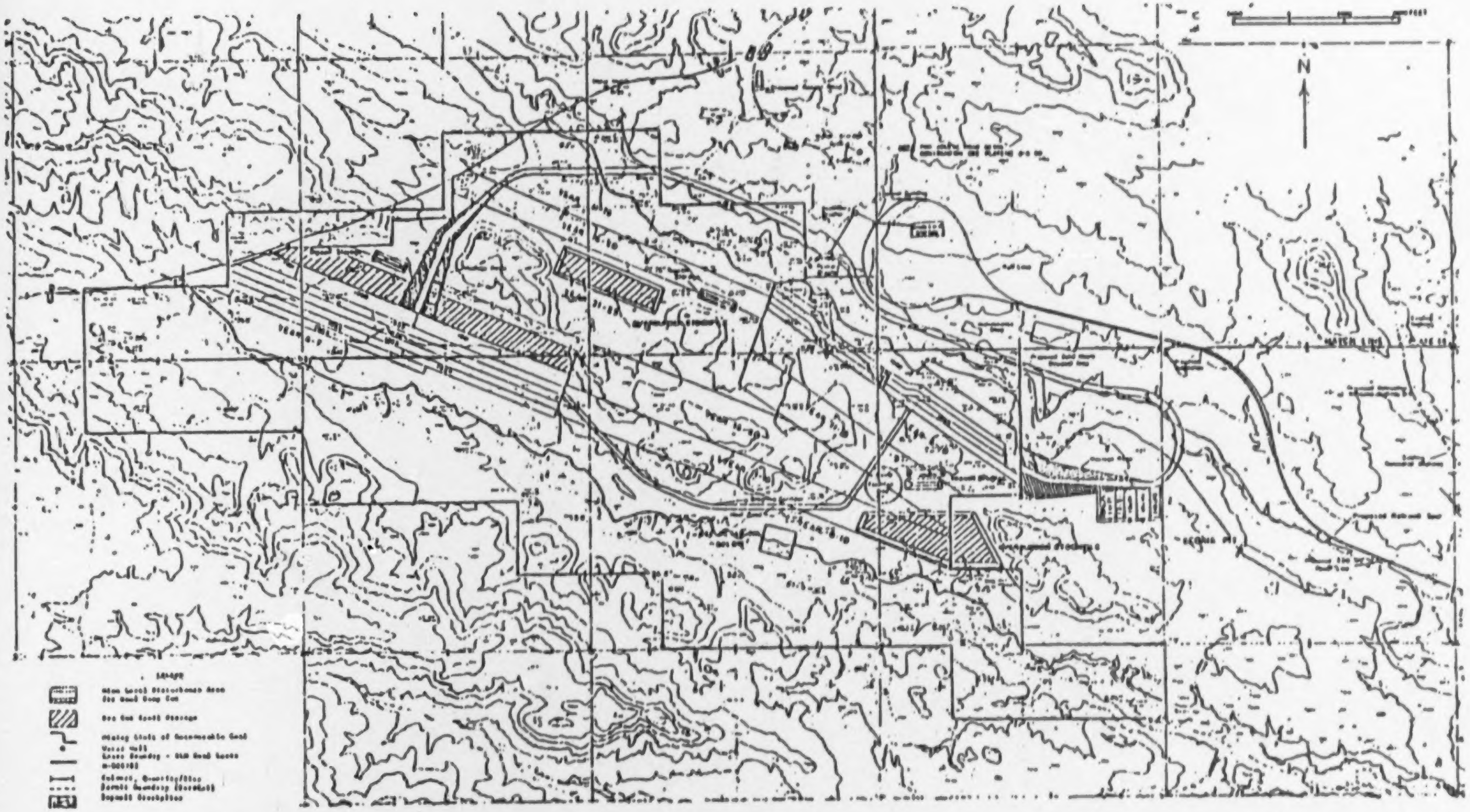


Figure 3. --Mine facilities and mining sequence. (USGS and Mt. DSL, 1979, fig. V111-8)

Beginning at the haulroad, the dragline stripped overburden, casting the spoil material south of the boxcut, proceeding northwestward. The northeast boxcut has been completed by the end of mining year 2. Because the spoil material has been cast to the south, rehandling of this material by the dragline is necessary during the next two to three cuts. Currently the dragline alternates between the southwestern and northeastern areas, making successive cuts and casting the spoil material into previously mined-out areas.

Further mining will involve the truck and shovel fleet stripping the high overburden (above the 120-foot overline) of the central bluff area in advance of the dragline. Spoil material stripped by the truck and shovel fleet would be transported to areas which have insufficient spoil materials to achieve the proposed reclamation contours. Reclamation of those areas disturbed by mining would not commence until about mining year 4. (U. S. Geological Survey and Montana Department of State Lands, 1979)

In addition to approximate original contour concerns, the mining method is necessitated by the regulatory requirement that NERCO bury all sodic spoil material under eight feet of non-sodic material. Excess sodium in regraded soil or near-surface spoil may cause dispersion of soil particles, which could lead to structural instability, reduced infiltration and permeability, increased erodibility, and surface crusting. In terms of vegetation, this situation could lead to increased mechanical resistance to seedling emergence and root elongation, leading to decreased water availability and thus to increased mortality. In order to cover all sodic spoil areas with non-sodic overburden, the two-pit sequence is being used. (Harrington, 1980; Larson, 1980)

Given the low overburden-to-coal ratio, the general land surface will be lowered up to 100 feet in elevation. The U. S. Geological Survey and Montana Department of State Lands (1979) have described the final reclamation landscape as a "long, broad, featureless plane," lacking topographic diversity. (p. VIII-4) Such topography is not considered of great value as wildlife habitat.

The overall wildlife impact of the Spring Creek Mine is "more severe than any of the other existing or currently proposed coal strip mining operations in southeastern Montana." (U. S. Geological Survey and Montana Department of State Lands, 1979, p. III-17) The destruction of habitat is considered the most important reason for these impacts. Antelope will be the most significantly affected of all mammals. Impacts to raptors may be significant, and will include destruction of nesting habitat in the bluff area between South Fork and Spring Creek. (U. S. Geological Survey and Montana Department of State Lands, 1979, p. VIII-57,58)

REFERENCES

Harrington, Neil. 1980. Personal communication: soil scientist, Montana Department of State Lands staff, interview, September 3.

Larson, John. 1980. Personal communication: NERCO staff, telephone conversation, October 23.

U. S. Geological Survey and Montana Department of State Lands. 1979. Final environmental statement, proposed mining and reclamation plan, Spring Creek Mine, 1 vol.

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
SPRING CREEK MINE	SPRING CREEK COAL CO. (PACIFIC POWER & LIGHT CO.)	M-069782	2346.76	8S39E 22-27 8S40E 30, 31	7/1/1965	$1.00	20¢/TON	PRODUCING

STATE: MONTANA **REGION:** POWDER RIVER **COUNTY:** BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
SPRING CREEK MINE	SPRING CREEK COAL CO.	M069782	3019 a	COAL		DRAGLINE, TRUCK/SHOVEL	PRODUCING	10MTY
				2347a	0			
				SURFACE				
				320a	4100a			

~~MINE PLAN OR~~ LEASE BLOCK RESERVES:

IN-PLACE: 287 MT

RECOVERABLE: 243 MT (PRESENTLY PROPOSING RECOVERY OF 184 MT)

SOURCE: USGS Mt. D.S.L. 1979

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF MONTANA C-535-65 (640a)[1]

FEE (SCRUTCHFIELD) (340a)[1]

COMMENTS:

[1] NO PLANS TO MINE THESE LEASES

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME OR LEASE BLOCK SPRING CREEK MINE	LESSEE(S) SPRING CREEK COAL CO.	NUMBER OF LEASES 1	DATE MINE OPENED: 1980 PROJECTED CLOSING DATE: 2006 REMAINING MINE LIFE: 25 YEARS
REMAINING RECOVERABLE RESERVES: FEDERAL: 248 MT NON-FEDERAL: 0	MINE DESIGN CAPACITY 10 MTY RECOVERY RATE: 85%		CUMULATIVE PRODUCTION TO 1979: 0 1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	0.1	0.1	0.2[2]
1981	5	5	5
1982	6	6	6
1983	7	7	7
1984	7-10[1]	7-10	7
1985	7-10	7-10	7
1986	7-10	7-10	7
1987	7-10	7-10	7
1988	7-10	7-10	7
1989	7-10	7-10	7
1990	7-10	7-10	7
Post 1990	7-10	7-10	7

NOTES:

1. Production will increase to 10 Mty if South Fork Spring Creek alluvial valley floor reclamation plan is approved and if market is found for additional coal.
2. Sold entirely to Houston Lighting and Power.

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIGHORN

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
SPRING CREEK MINE	SPRING CREEK COAL CO.	1	DRAGLINE, TRUCK / SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEA
SEAM NAME	ANDERSON/DIETZ 1 & 2	CANYON						
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS B							
THICKNESS	81'	19'						
BTU/LB	9407	9508						
SULFUR (%)	.33	.36						
ASH (%)	3.63	3.66						
MOISTURE (%)	24.50	24.29						
FIXED CARBON (%)	40.04	41.47						
VOLATILE (%)	31.83	30.64						
SEAM DEPTH	15 - 160	106 (INT.)						
IN-PLACE RESERVES	287	-						
RECOVERABLE RESERVES	243	0						
RECOVERY RATE	85%	0						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL [1]	TOTAL	SOURCE
IN-PLACE:	TOTAL	—	0	—	USGS &
	SURFACE	287	0	287	Mt D.S.L., 19
	UNDERGROUND	—	0	—	
RECOVERABLE:	TOTAL	0	0	0	
	SURFACE	243[2]	0	243[2]	
	UNDERGROUND	0	0	0	

NOTES:

[1] in place reserves of Mt. State Lease - 74 MT
Fee Lease - 44 MT
reserves considered uneconomical and not proposed for recovery

[2] presently proposed recovery of 189 mt

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: West Decker Mine

Lease Number(s): M057934 M057934A M061685 M06770 M37604

Location: Big Horn County, Montana

Lessee: Decker Coal Company, Kukuchka (M06770) (Peter Kiewit Sons' and Pacific Power and Light)

Operator: Decker Coal Company

Proximity to Other Operations: Five miles southeast of Spring Creek Mine, two miles west of East Decker

First Coal Shipped: 1972

1979 Production: 7.1 mt

1980 Production: 5.5 mt

Ultimate Mine Design Capacity: 10.4 mty

Remaining Mine Life: 26 years

Mining Method: Dragline, truck/shovel

Recovery Rate: 94%

Permitted Mine Plan Area: 3,565.2 acres

Federal Lease Area Associated with Mine Plan: 5,400.8 acres

Pending Actions: Application for North Extension would add 3.158 acres

---

Coal Data

Seam Name(s): Anderson-Dietz 1/Dietz 2 (D-1) Dietz 3 (D-2)

Thickness (ft): 52 (D-1) 18.5 (D-2)

Rank: Subbituminous

BTU/lb: 9,553 (D-1) 9.262 (D-2)

Sulfur (%): 0.33 (D-1) 0.38 (D-2)

Overburden Thickness: 20-300 ft

Overburden/Coal Ratio: 3.3

Reserves:

Total recoverable permitted mine plan (mt): 158.5

Total recoverable permitted federal in mine plan (mt): NA

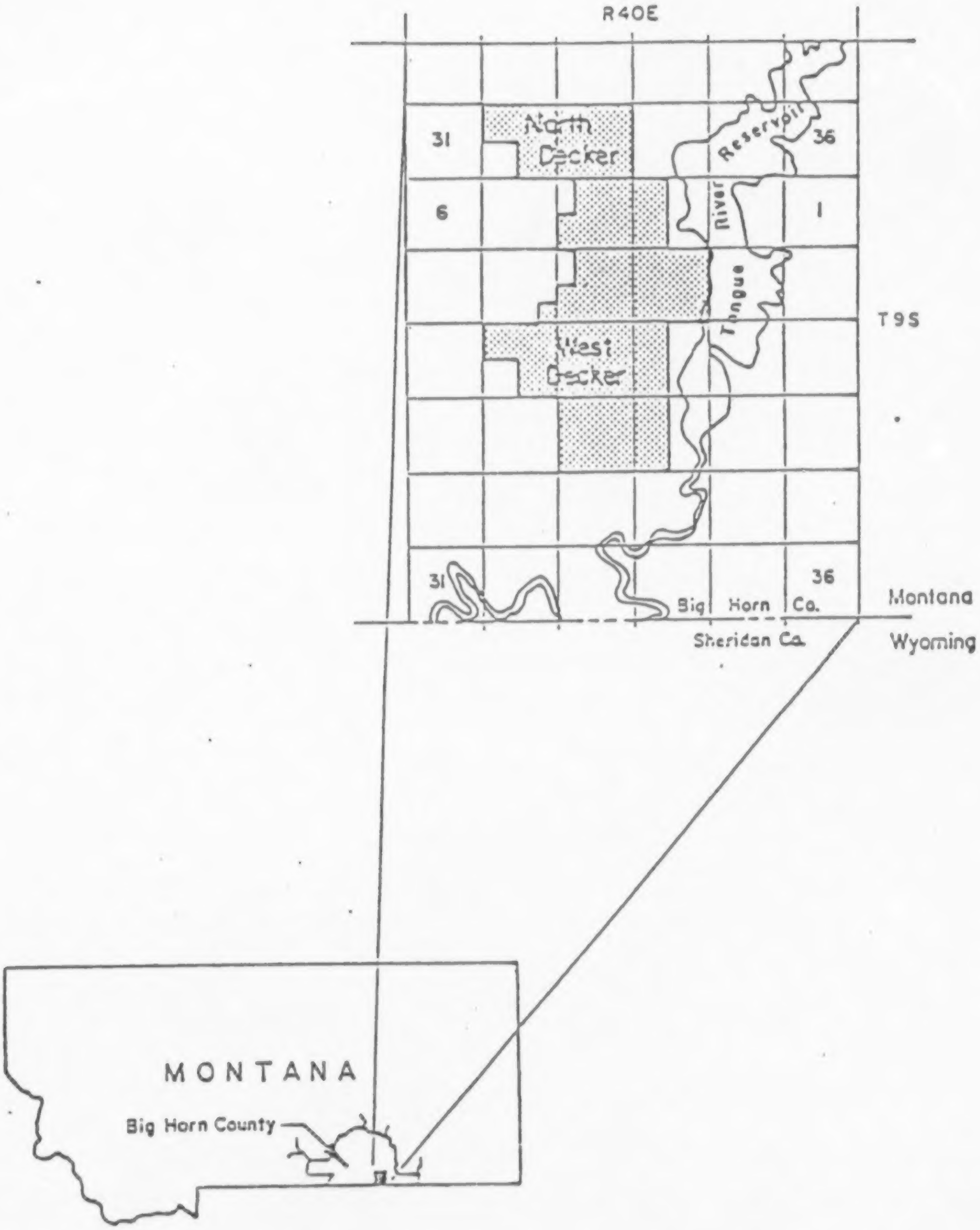
Total recoverable federal in leaseblock: C

Notes:

Alluvial valley floor determinations (subsequently found negative) have delayed approval of the North Decker extension proposal. Approval of the North Extension mine application is expected in early 1982.

State regulatory authorities continue to monitor the high potential for upward leaching of sodic spoils into the topsoil, which drought conditions could bring on.

Under the new five-year permit, the mining method has been altered to include truck/shovel stripping. Sixty million cubic yards of spoils will be stockpiled and used for final back-filling to meet approximate original contour requirements.


R40E
31
North Decker
36
Reservoir
6
River
1
Tongue
T9S
West Decker
31
36
Big Horn Co.
Montana
Sheridan Co.
Wyoming
MONTANA
Big Horn County

—Location of the West Decker mine.

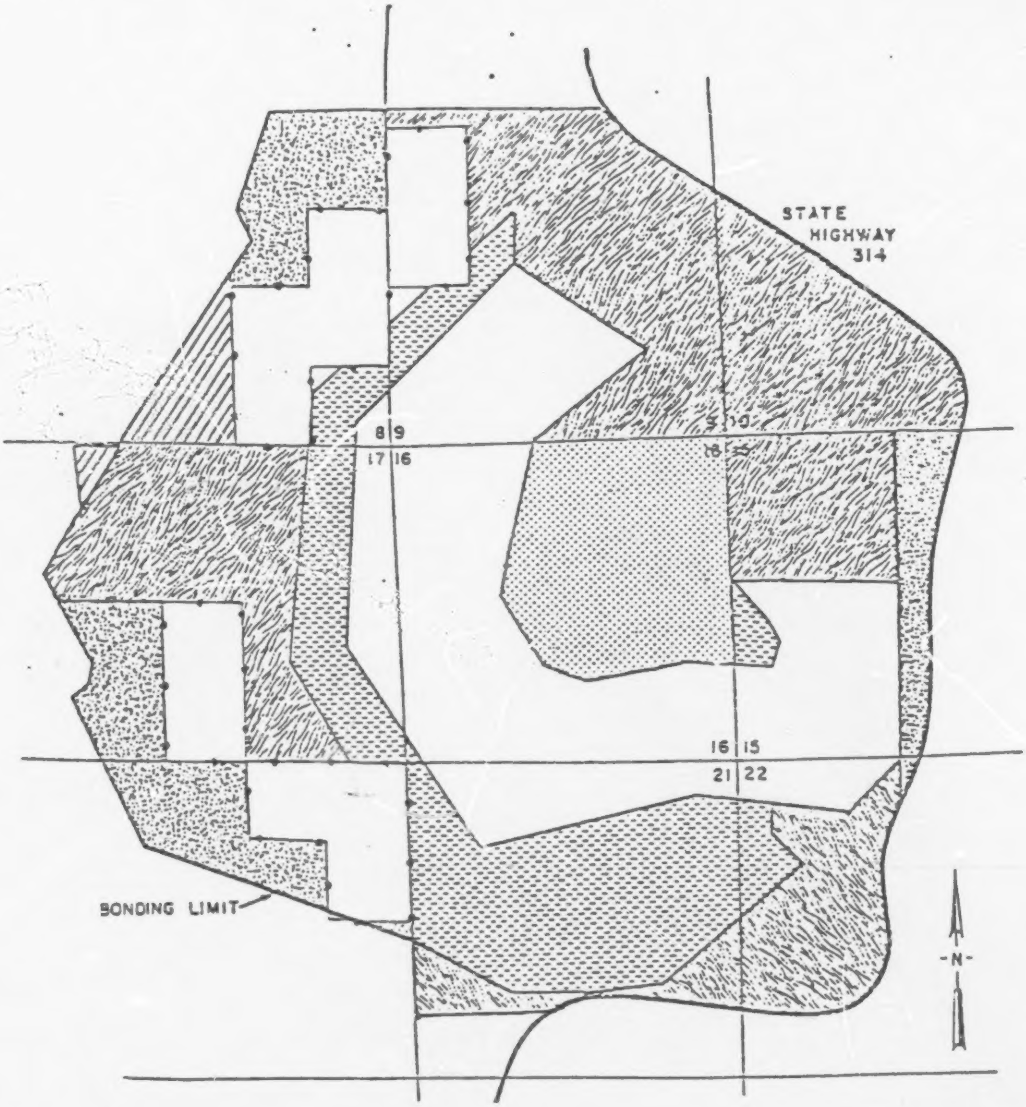
(Mt. DSL,1980,Fig.I-1)

WEST DECKER MINE

The Decker Coal Company, a joint venture of NERCO, Inc., a subsidiary of Pacific Power and Light Co. and Peter Kiewit Sons' Company, operates the West Decker Mine, located about 25 miles northeast of Sheridan, Wyoming. Mining operations began at West Decker in August 1972, and about 57.7 million tons of coal were produced from 1972 through 1979. Not only has Decker Coal Company expanded its West Decker operation, but it has also opened the East Decker Mine (described in the next section) and is applying for a major expansion of the West Decker operation into an area known as the North Extension. Regulatory authorities approved Decker Coal Company's 5-year permit application to continue operations at West Decker in 1981. Operations at the West Decker pit will continue to 2001 with the recovery of 158.5 million tons of coal. Decker Coal has revised its North Extension mine application, first proposed in 1975, and regulatory approval is expected in early 1982. The planned production of 2.4 million tons per year at North Extension will not represent an increase in coal production because coal from the North Extension will be blended with West Decker coal to meet existing Decker Coal contract commitments.

Background

Initial mining at West Decker was conducted on one state coal lease and two federal coal leases (Fig. 1). State coal lease No. 537 was obtained in November 1963 and is located in 9S40E16. Federal coal lease M-061685, obtained in March 1964, covers 2,360 acres. Federal coal lease M-057934A, covering 1,841 acres, was obtained in October 1963. Federal coal lease M-37604, covering 440 acres, was obtained in July 1981.


STATE
HIGHWAY
314
8 9
17 16
9 10
16 15
16 15
21 22
BONDING LIMIT
N

Federal leases- No. M-057934, M-057934A, and M-061685

▨ 5-year permit area ▨ mine life

▨ State lease No. 537.

☐ State and Federal lease already mined.

☐ Existing short-term lease application areas. (Awarded 7/81)

▨ Future short-term lease application area.

▨ Decker surface, no leases.

Figure 1. --Coal leases in the Decker area.

(Mt.DSL,1980,Fig.I-2)

Decker Coal is expected to apply for a 120-acre short-term lease when the necessary prerequisites are met.

The proposed North Extension is located largely on three federal coal leases: M-057934, M-57934-A, and M-061685 (Figs. 2, 3). Lease M-057934 was issued on October 1, 1963; lease M-061685 was issued on March 1, 1964; and on October 1, 1971 some of the lands covered by lease M-057934 were reassigned under lease M-057934-A. No state coal leases exist in the North Extension area. A small abandoned surface coal mine called the Tongue River Mine covers parts of two 40-acre tracts in the North Extension area. The northernmost tract in 8S40E83 is on federal coal lease M-06770, held by Glenn Mock. It would be included in the North Extension under an operating agreement between Mock and Decker Coal. Also included in the North Extension is fee coal owned by Rosebud Coal Sales Co., a Peter Kiewit Sons' subsidiary.

Surface ownership in the Decker area is indicated in Figures 4 and 5.

Physical Environment

The West Decker area is drained by three ephemeral streams, Spring Creek, Pearson Creek, and Pond Creek. The West Decker pit is located in the lower reaches of the Pond Creek drainage, an amphitheater-shaped drainage opening to the east. Spring and Pearson Creeks both flow through the proposed North Extension. The broad lower reaches of these stream valleys and their low interstream divides form a rolling, locally hummocky terrain proposed for mining. The West Decker permit area ranges in elevation from 3,420 to 3,700 feet.

Decker Coal Company is mining coal seams of the Tongue River member of the Fort Union formation. Two strippable coal seams underlie the mining

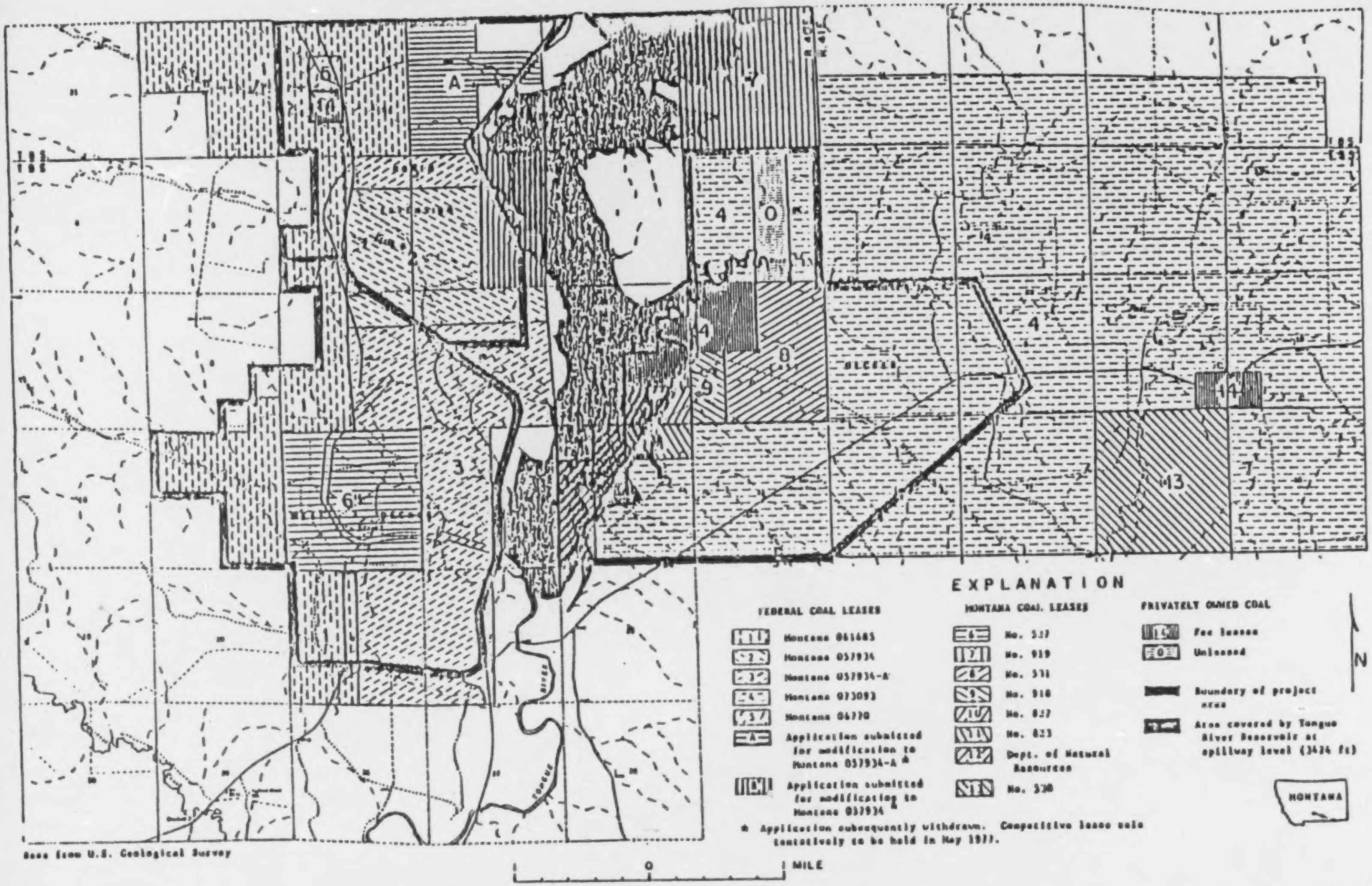
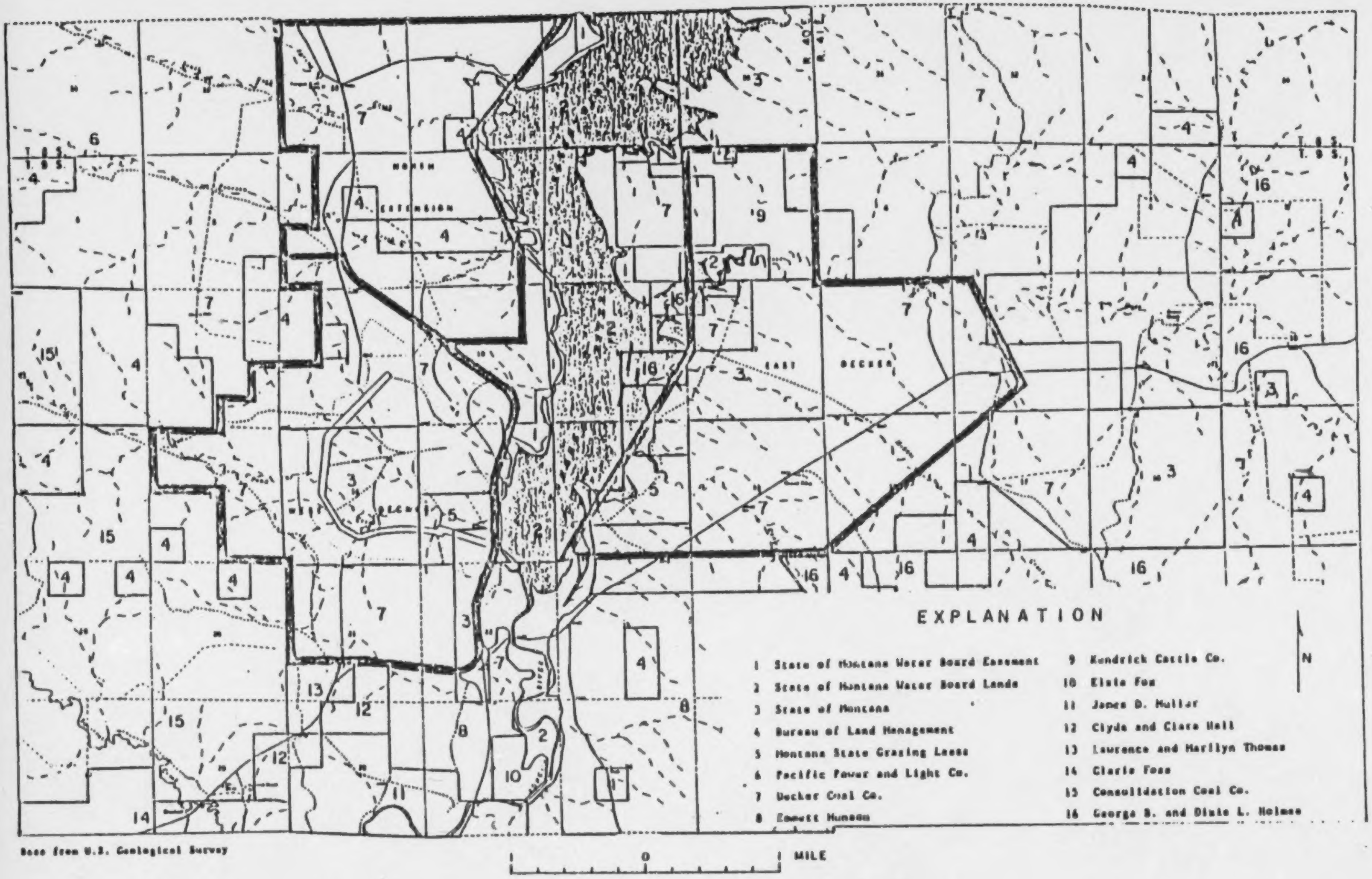

A
4
0
4
8
9
4
14
13
3
6
1
2
DECKER
EXPLANATION
FEDERAL COAL LEASES
Montana 061685
Montana 057934
Montana 057934-A
Montana 073093
Montana 06770
Application submitted for modification to Montana 057934-A *
Application submitted for modification to Montana 057934 *
MONTANA COAL LEASES
No. 527
No. 919
No. 531
No. 918
No. 822
No. 823
Dept. of Natural Resources
No. 530
PRIVATELY OWNED COAL
Fee leases
Unleased
Boundary of project area
Area covered by Tongue River Reservoir at spillway level (3424 ft)
N
MONTANA
* Application subsequently withdrawn. Competitive lease sale tentatively to be held in May 1977.
Base from U.S. Geological Survey
0
1 MILE

Figure 2- Coal leases held or controlled by the Decker Coal Company in the Decker area, Big Horn County, Montana.

(USGS and Mt. DSL, 1979, fig. 1)

WD-4


NORTH EXTENSION
EAST DECKER
WEST DECKER
EXPLANATION
1 State of Montana Water Board Easement
2 State of Montana Water Board Lands
3 State of Montana
4 Bureau of Land Management
5 Montana State Grazing Lease
6 Pacific Power and Light Co.
7 Decker Coal Co.
8 Emmett Hunsen
9 Kendrick Cattle Co.
10 Elsie Fox
11 James D. Muller
12 Clyde and Clara Hall
13 Lawrence and Marilyn Thomas
14 Clarie Foss
15 Consolidation Coal Co.
16 George B. and Dixie L. Holmes
N
1 0 1 MILE

Base from U.S. Geological Survey

Figure 3.- Land (surface) ownership in the Decker area, Big Horn County, Montana.

(USGS and Mt. DSL, 1977, fig. 1b)

WD-5

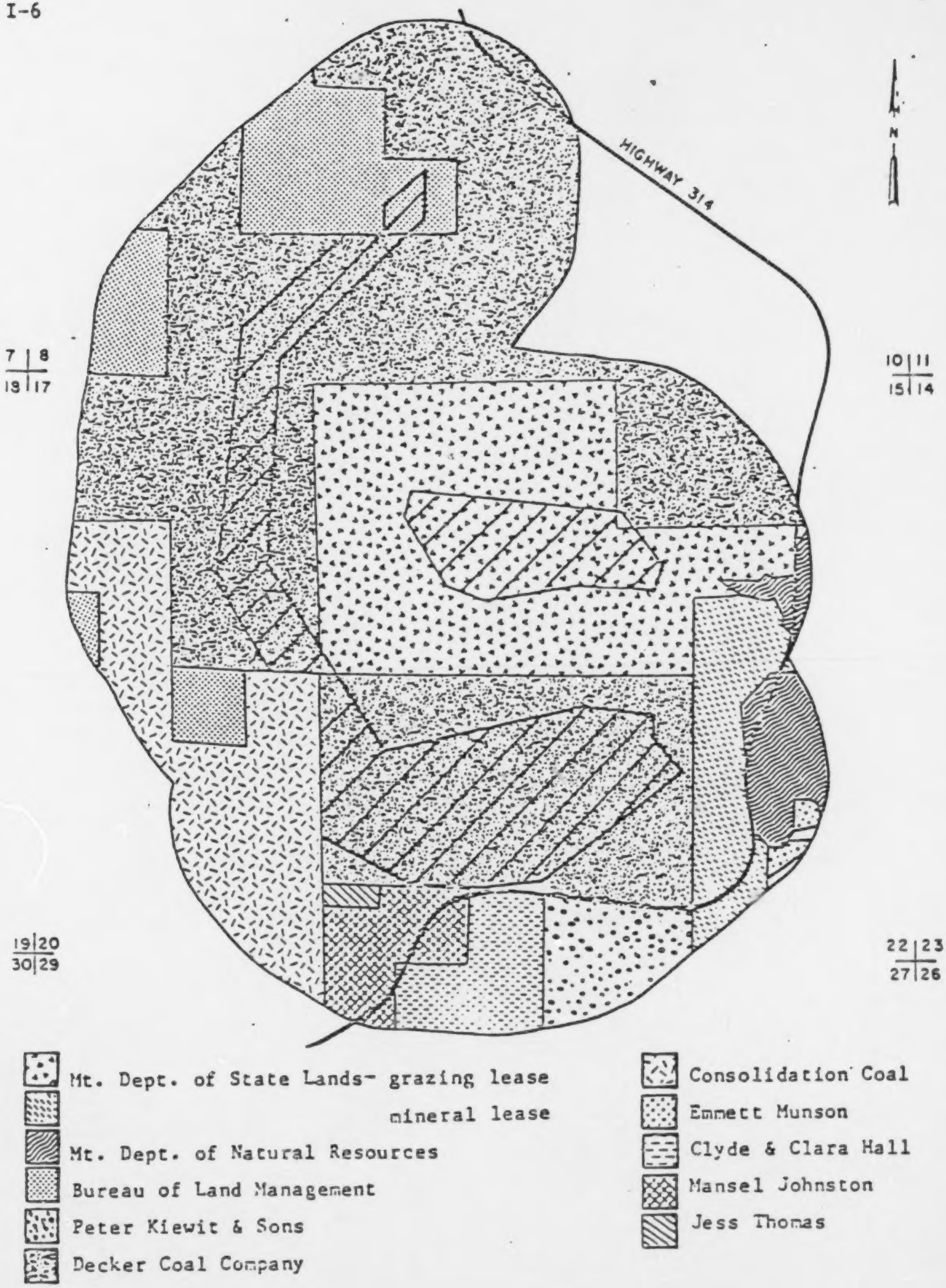
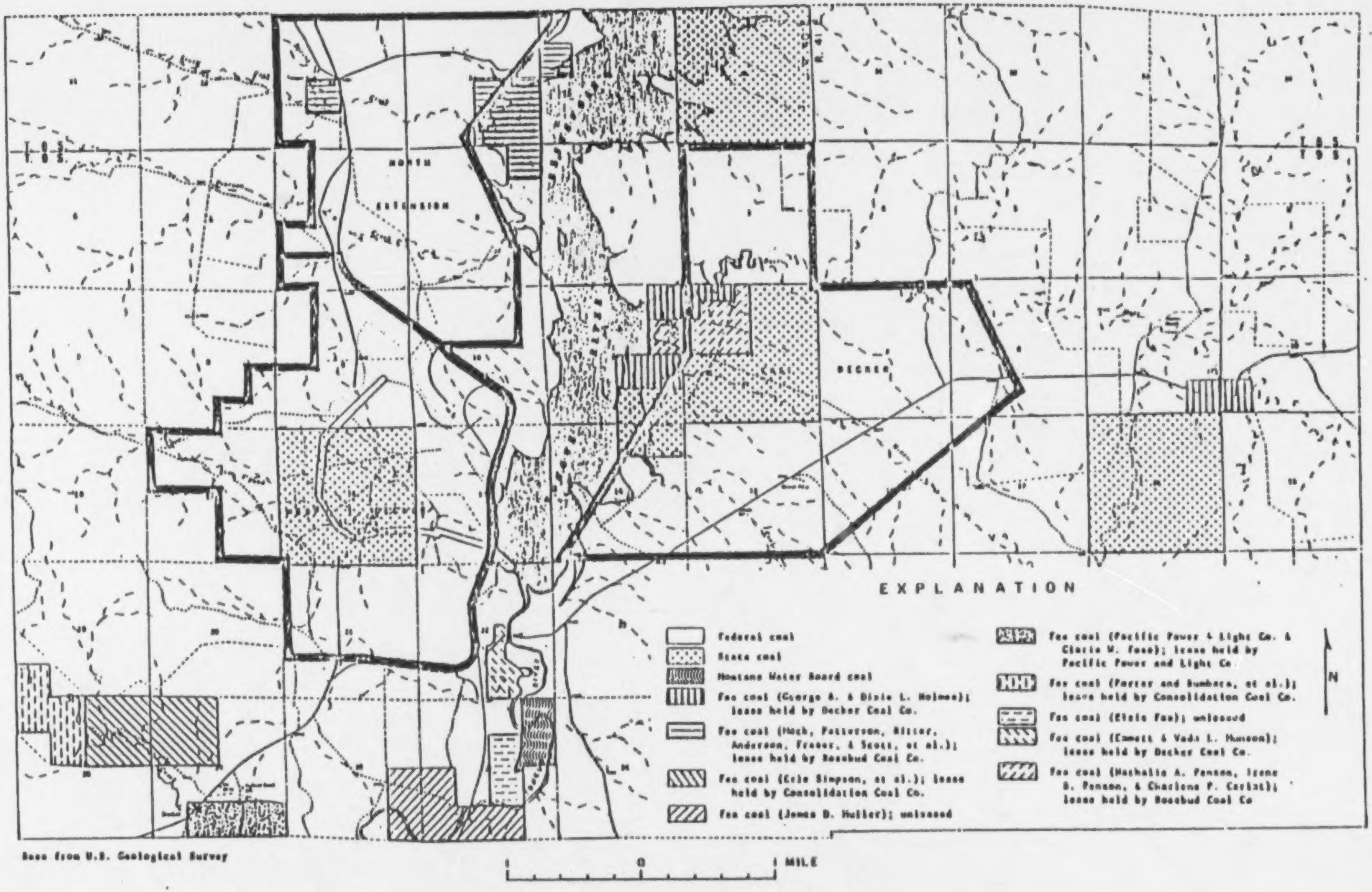

HIGHWAY 314
N
7 | 8
18 | 17
10 | 11
15 | 14
19 | 20
30 | 29
22 | 23
27 | 26
Mt. Dept. of State Lands- grazing lease
mineral lease
Mt. Dept. of Natural Resources
Bureau of Land Management
Peter Kiewit & Sons
Decker Coal Company
Consolidation Coal
Emmett Munson
Clyde & Clara Hall
Mansel Johnston
Jess Thomas

Figure 4 --Surface ownership at West Decker.

(Mt. DSL, 1980, fig. I-3)


NORTH EXTENSION
DECKER
EXPLANATION
Federal coal
State coal
Montana Water Board coal
Fee coal (George A. & Dixie L. Holmes); lease held by Decker Coal Co.
Fee coal (Mock, Patterson, Ritter, Anderson, Fraser, & Scott, et al.); lease held by Rosebud Coal Co.
Fee coal (Erle Simpson, et al.); lease held by Consolidation Coal Co.
Fee coal (James D. Muller); unleased
Fee coal (Pacific Power & Light Co. & Clarie W. Foss); lease held by Pacific Power and Light Co.
Fee coal (Porter and Bumbaca, et al.); lease held by Consolidation Coal Co.
Fee coal (Elsie Fox); unleased
Fee coal (Emmett & Vada L. Munson); lease held by Decker Coal Co.
Fee coal (Nathalie A. Fenson, Irene B. Fenson, & Charlene F. Corlat); lease held by Rosebud Coal Co
N
1
0
1 MILE

Base from U.S. Geological Survey

Figure 5 - Coal ownership in the Decker area, Big Horn County, Montana.

(USGS and Mt. DSL, 1977, fig. 1A)

area, the Anderson-Dietz 1/Dietz 2 (upper) seam and the Dietz 3 (lower) seam. Decker Coal Company terms the upper seam the D-1 and the lower the D-2. For the sake of clarity, this report will use the company's terms for these seams. At the West Decker pit, only the D-1 seam is being recovered, except in the mine interior where the D-2 seam has been mined since 1981. At the North Extension, both seams will be mined.

At the West Decker pit, overburden ranges from a few tens of feet to over 300 feet. Here the Anderson-Dietz 1 and Dietz 2 seams are merged, forming the seam which Decker terms "D-1" (Fig. 6). The D-1 seam varies from 44 to 58 feet in thickness. There is a one-to-two foot thick unnamed rider seam above the D-1 seam at West Decker. The rider seam is separated from the D-1 seam by eight inches of shale. Interburden between the D-1 and D-2 seams varies from 30 to 70 feet. West of the Decker Coal properties, the D-1 and D-2 seams merge at the Spring Creek Mine.

At the North Extension, much of the D-1 seam is burned and is of variable thickness. The D-2 seam underlies the entire area and will be mined.

Mining and Reclamation: Methods and Issues

The West Decker operation utilizes a dragline to remove overburden from a single horseshoe-shaped pit (Fig.7). In 1981 a truck/shovel stripping operation was added to the mine plan to implement the spoil stockpiling required to achieve the approved post-mining topography. Mining has generally progressed westerly, with the horseshoe expanding in size. Mining will progress to the north until the D-1 burn line is encountered. Mining will progress to the southeast until a major fault line is reached. Mining will move westerly into increasing cover until the bonded mine

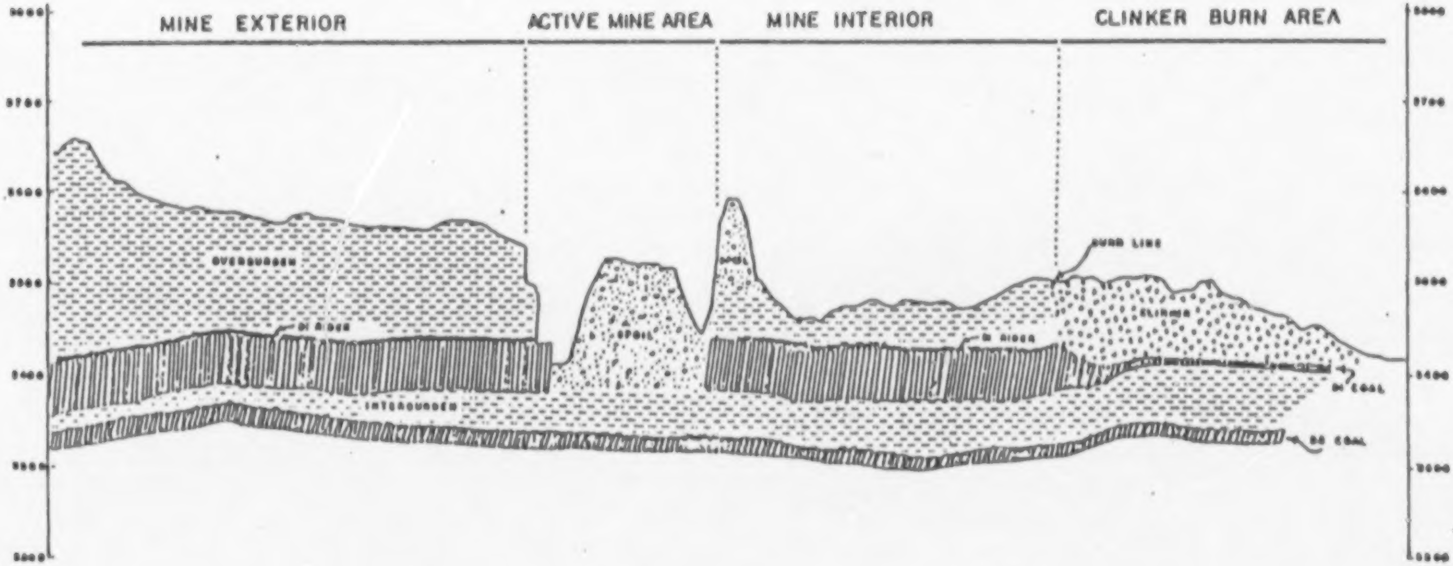

MINE EXTERIOR
ACTIVE MINE AREA
MINE INTERIOR
CLINKER BURN AREA
OVERBURDEN
D1 RIDER
SPOIL
SPOIL
D1 RIDER
BURN LINE
CLINKER
INTERBURDEN
D1 COAL
D2 COAL

Figure 6 --Stratigraphy in the West Decker mine area.
(Mt DSL, 1980, Fig. II-1)

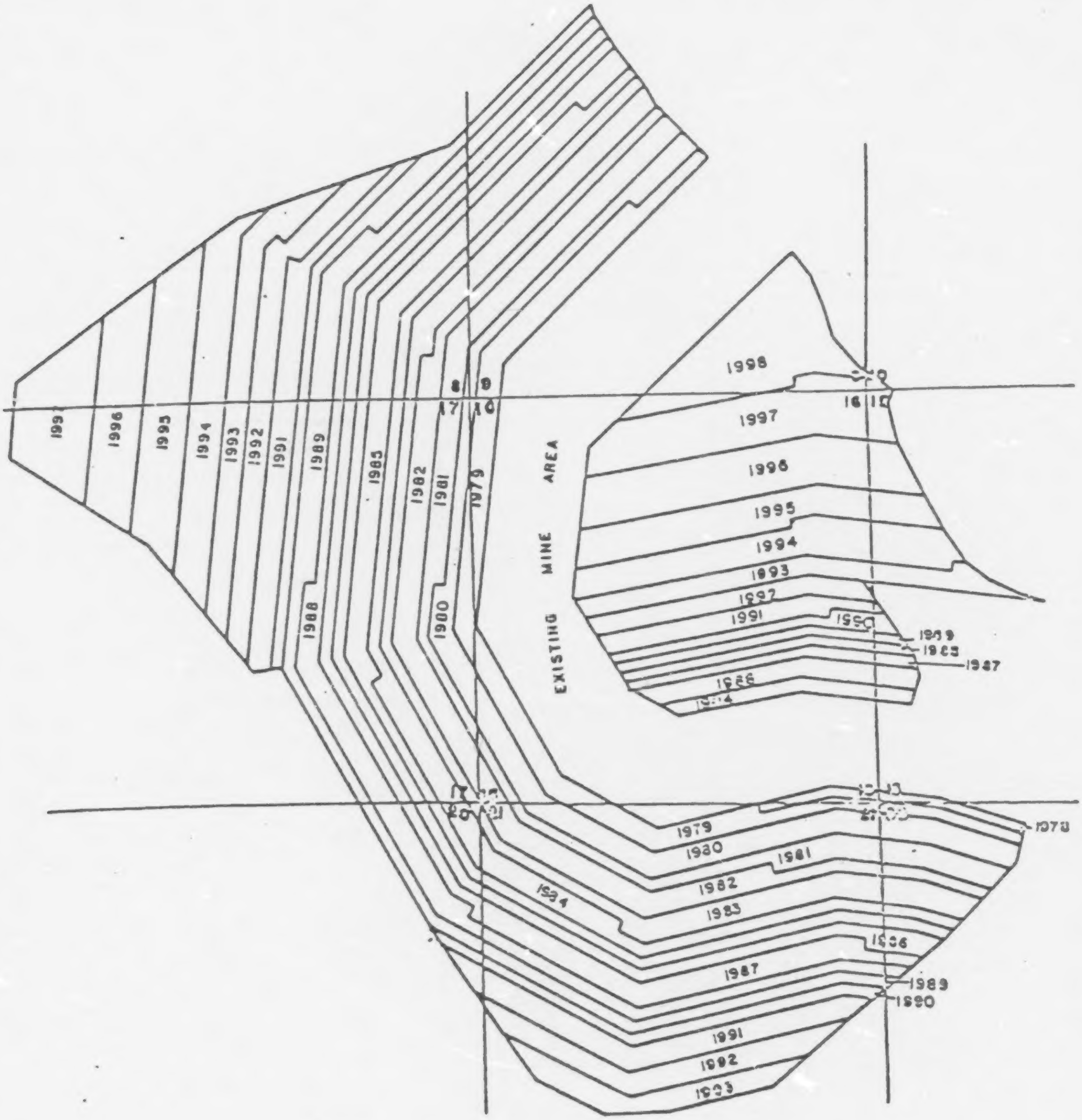

8
9
17
10
16
15
1997
1996
1995
1994
1993
1992
1991
1989
1985
1982
1981
1979
1988
1900
EXISTING MINE AREA
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1984
17
20
21
1978
1979
1980
1981
1982
1983
1984
1986
1987
1989
1990
1991
1992
1993

Figure 7 --Mining sequence, with the short-term leases, west Decker pit
(Mt DSL,1980,Fig.I-7)

boundary and economic stripping limit is approached. Beginning in September 1981, mining in the horseshoe has operated on a two-pit basis.

There is a long-standing history of regulatory concern about the failure of the Decker Coal Company to recover the D-2 seam at the West Decker pit. Presently, the Decker Coal Company is required to mine the D-2 from the state coal lease in the horseshoe interior. Approval of Decker Coal's short-term lease application was delayed while the USGS evaluated whether recovery of the D-2 should be required in the newly-applied areas in the mine exterior. The lease was approved in July 1981; however, the final decision of whether the D-2 will be mined has not been resolved. It is unlikely, however, that Decker Coal Company will be required to alter its existing mine plan for the already-approved leases. (D. Gilchrest, 1980)

The North Extension would be developed in pits distinct from the West Decker pit. Two boxcuts are proposed (Fig. 8), each progressing westward, offset by 0.5 mile. The north cut would be one mile long, while the south cut would be about 1.25 miles long. The advance of each pit would be dictated by coal quality and the need for blending.

A major issue in the review of the North Decker application has been the status of Spring and Pearson Creeks as alluvial valley floors. After several years of study and discussion, regulatory authorities have determined that neither valley meets alluvial valley floor criteria. Thus, the Decker Coal Company will be able to propose mining in all areas originally proposed in 1976.

Overburden at the Decker Coal mines is characterized by relatively high sodium levels (sodium absorption ratios of about 28), fine textures, and a dominance of clays with high shrink/swell potential. Each of these

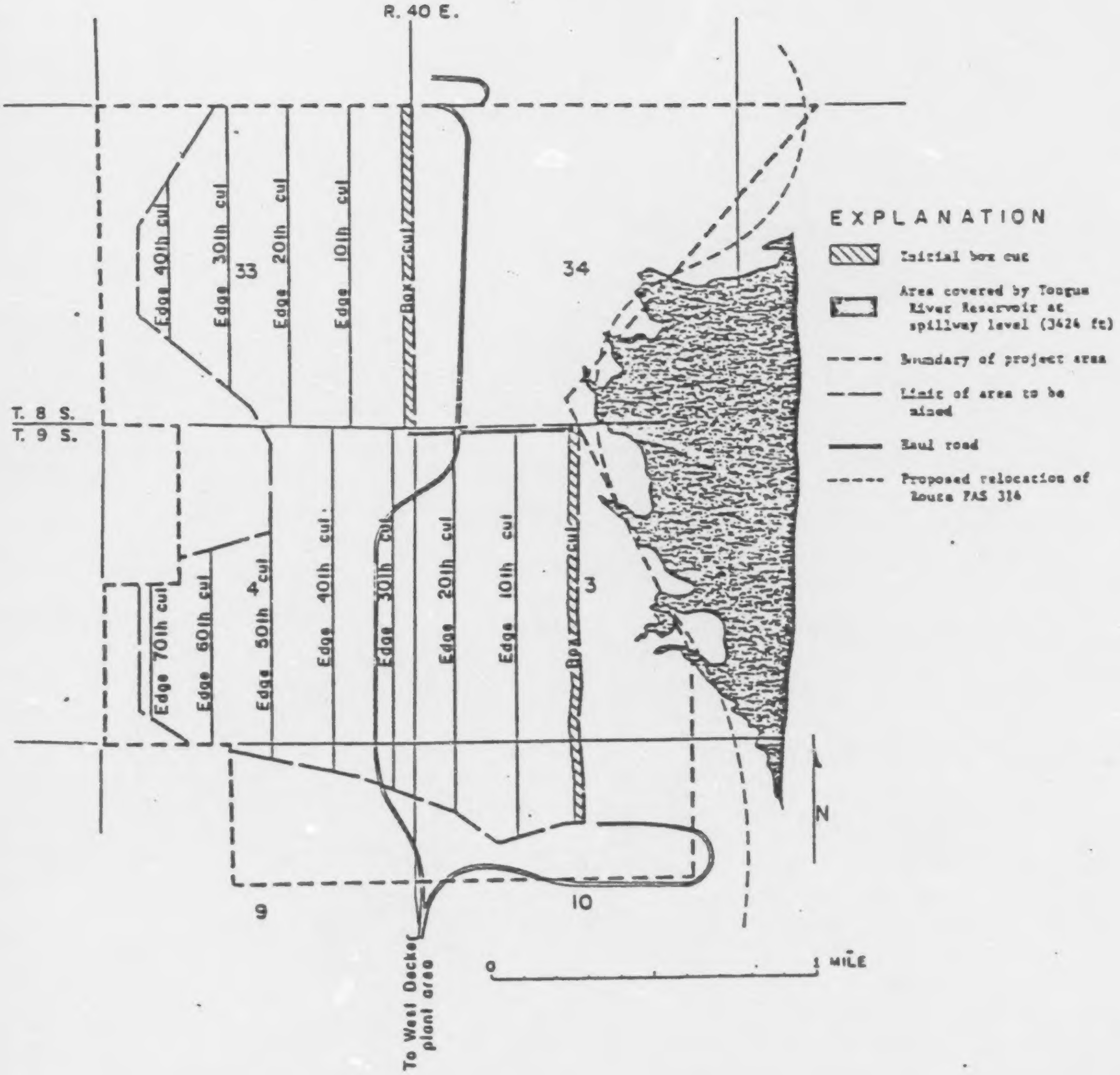

R. 40 E.
T. 8 S.
T. 9 S.
33
34
4
3
9
10
Edge 40th cut
Edge 30th cut
Edge 20th cut
Edge 10th cut
Box cut
Edge 70th cut
Edge 60th cut
Edge 50th cut
Edge 40th cut
Edge 30th cut
Edge 20th cut
Edge 10th cut
Box cut
EXPLANATION
Initial box cut
Area covered by Tongue River Reservoir at spillway level (3424 ft)
Boundary of project area
Limit of area to be mined
Haul road
Proposed relocation of Route FAS 314
N
0
1 MILE
To West Decker plant area

Figure 8 - Mining sequence and location of roads in the North Extension area.

(USGS+Mt DSL,1977,Fig.13)

attributes is considered non-conducive to successful revegetation. The Montana Department of State Lands (1980) notes that accumulations of sodium and other salts may occur in topsoil spread over sodic spoils, particularly in steeply sloping areas, such as the reduced highwall area. Since the highwall areas will be the last to be regraded, problems might not be noticed until after the 10-year bonding period has elapsed.

However, upward movement of sodium from spoils into topsoil has not been noticed to date at the West Decker pit. In fact, it appears that sodium may be leached downward. Precipitation at Decker has been above normal in recent years, which is likely to have caused the leaching. If drought conditions occur at Decker, sodium may begin to move upward into regraded topsoil, creating future reclamation problems. The situation is under continuing regulatory review. (Montana Department of State Lands, 1980)

Regrading to approximate original contour has also been a concern to regulatory agencies at both West Decker and the North Extension. Spoils at North Decker will be rehandled to achieve a natural drainage pattern. The recently approved life-of-mine plan for post-mining topography at West Decker will require stockpiling of approximately 60 million cubic yards of spoils during the remainder of the mine life. This material will be used to backfill the western portion of the mine area such that Pond Creek and its tributary drainages will flow in a dendritic pattern through the mine area. Because of the large area needed to stockpile this amount of material, all areas not yet reclaimed will be used for spoil storage. No additional reclamation, therefore, will be conducted at West Decker until the end of mining. This stockpiling requirement, which is part of the recently approved West Decker amendment, has caused the West Decker Mine to begin using a truck/shovel stripping operation in addition to its draglines.

REFERENCES

Gilchrest, Don. 1980. Personal communication: USGS Conservation Division, Billings, telephone conversation, October 2.

Montana Department of State Lands. 1980. Draft environmental impact statement on the proposed mining and reclamation plan for the West Decker Mine Extension: 1 vol.

U. S. Geological Survey and Montana Department of State Lands. 1977. Final environmental impact statement proposed plan of mining and reclamation, East Decker and North Extension Mines: 2 vols.

STATE: MONTANA **REGION:** POWDER RIVER **COUNTY:** BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
WEST DECKER MINE	KUKUCHKA	M06770	40.0	8S40E 33	1/1/45	$1.00	15¢/TON	APPLICATION PENDING
	DECKER COAL CO.	M057934A	1840.55	9S40E 3,4, 9,10,15,21,22	10/1/63	$1.00	15¢/TON	PRODUCING
	DECKER COAL CO.	M057934	720.0	9S40E, 3,4, 9,10.	10/1/63	$1.00	15¢/TON	APPLICATION PENDING
	DECKER COAL CO.	M061685	2360.20	8S40E 32,33 9S40E 4,8, 9,17,21	3/1/64	$1.00	15¢/TON	PRODUCING
	DECKER COAL CO.	M37604	440.0	9S40E, 8,9, 17,20	7/1/81	-	-	PRODUCING
			5400.75					

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
WEST DECKER MINE	DECKER COAL CO ALL EXCEPT: KUKUCHKA (M-06770)					DRAGLINE, TRUCK/ SHOVEL		
		M057934-A M-37604 M-061685	WEST DECKER PERMITTED 3565.21a				PRODUCING	10.4 MTY
		M-06779 M-057934-A M-057934 M-061685	NORTH EXTENSION APPLIED 3158a				APPLICATION REVIEW	

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE:

RECOVERABLE: 158.5

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

MONTANA LEASE # 537.

FEE COAL (ROSEBUD COAL SALES CO.)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: MONTANA | REGION: POWDER RIVER | COUNTY: BIG HORN

MINE NAME OR LEASE BLOCK WEST DECKER MINE	LESSEE(S) DECKER COAL CO.	NUMBER OF LEASES 5	DATE MINE OPENED: 1972 PROJECTED CLOSING DATE: 2006 REMAINING MINE LIFE: 25 YEARS
REMAINING RECOVERABLE RESERVES: FEDERAL: NA NON-FEDERAL: NA	MINE DESIGN CAPACITY: 10.4 MTY RECOVERY RATE: 94%		CUMULATIVE PRODUCTION TO 1979: 50.7 1979 ACTUAL PRODUCTION: 7,067,372 TONS

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	5.5[1]		5.5
1981	5.4		4.7
1982	4.7		5.0
1983	5.7		5.0
1984	7.4		5.0
1985	8.0		5.0
1986	8.0		5.0
1987	8.0		5.0
1988	8.0		5.0
1989	8.0		5.0
1990	8.0		5.0
Post 1990	8.0		5.0

NOTES:

[1] Coefield, 1981

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
WEST DECKER	DECKER COAL CO.	5	DRAGLINE, TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1[1]	SEAM 2[1]	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	D-1	D-2						
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS							
THICKNESS	52	18.5						
BTU/LB	9553	9262						
SULFUR (%)	0.33	0.38						
ASH (%)	3.73	5.29						
MOISTURE (%)	25.51	24.38						
FIXED CARBON (%)	39.26	41.46						
VOLATILE (%)	33.5	29.24						
SEAM DEPTH	20-300	30-70 (INTERBURDEN)						
IN-PLACE RESERVES	158.4	10.2						
RECOVERABLE RESERVES	148.9	9.6						
RECOVERY RATE	94%	94%						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL			158.5[2]	
	SURFACE			158.5	
	UNDERGROUND			—	

NOTES:

1. Data for existing West Decker mine
Source: Montana Dept. of State Lands, 1980

2. 56.7 MT PROPOSED FOR RECOVERY AT NORTH EXTENSION

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: East Decker Mine

Lease Number(s): M073093

Location: Big Horn County, Montana

Lessee: Decker Coal Company
(Peter Kiewit Sons' and Pacific Power & Light)
Operator: Decker Coal Company

Proximity to Other Operations: Two miles east of West Decker Mine

First Coal Shipped: 1978

1979 Production: 5.9 mt

1980 Production: 5.7 mt

Ultimate Mine Design Capacity: 6.7 mty

Remaining Mine Life: 27+ years

Mining Method: Dragline, truck/shovel

Recovery Rate: 90%

Permitted Mine Plan Area: 4,145 acres

Federal Lease Area Associated with Mine Plan: 9,409.6 acres

Pending Actions: Five-year permit renewal, life-of-mine permit application

---

Coal Data

Seam Name(s): Anderson, Dietz 2, Dietz 3

Overburden Thickness: 30-400 ft

Thickness (ft): 52.8 (combined)

Overburden/Coal Ratio: 4

Rank: Subbituminous

BTU/lb: 9,175-9,703

Sulfur (%): 0.39-0.48

Reserves:

Total recoverable permitted mine plan (mt): 172.6

Total recoverable permitted federal in mine plan (mt): NA

Total recoverable federal in leaseblock: C

Notes:

Because state regulatory authorities prohibited Decker Coal from depositing spoil in Deer Creek, the company was forced to shift from its originally proposed dragline method to a truck/shovel/dragline operation. The company claims that 5.7 mt of recoverable coal will not be recovered because of this regulatory decision. Decker Coal raised its rates, claiming that the change in mining method had increased the cost of mining. The City of Austin is currently suing Decker Coal opposing the price increase.

EAST DECKER MINE

The East Decker Mine began operation in 1978. The mine is located on the east shore of the Tongue River Reservoir, about five miles northeast of Decker, Montana, and is operated by Decker Coal Company, a partnership of Peter Kiewit Sons' Co. and NERCO, Inc., a subsidiary of Pacific Power and Light Company.

Background

Peter Kiewit Sons' Co. successfully bid on federal coal lease M-073093 in 1966. On September 1, 1971 this lease was assigned to Decker Coal Company. The surface of the lease is owned by the Decker Coal Co., the State of Montana, the Kendrick Cattle Co., George B. Holmes, and the federal government. Decker Coal also holds six Montana state coal leases and two private leases.

Exploration work began at East Decker in 1973. In April 1975, Decker Coal submitted mine plans to the State of Montana and the U. S. Geological Survey. Since the proposal necessitated federal and state actions, it was determined that a joint environmental statement be prepared. The resulting EIS considered both the North Extension and East Decker proposals, and was almost 900 pages in length, as well as having 14 appendices. The EIS was issued in 1977 and the state issued a permit on July 13, 1977.

State and federal review of the Decker Coal proposals indicated numerous problems and questions with the plans. In light of these problems, Decker Coal chose to concentrate on gaining approval of the East Decker proposal. Of major concern to reviewing agencies was Decker Coal's proposal to spoil into Deer Creek, an intermittent stream tributary to the Tongue River Reservoir, and to spoil onto the shores of the reservoir. Although there were no alluvial valley floor provisions in either state or federal statute, the state chose to prohibit spoiling into the stream valley to protect the special wildlife and vegetation characteristics of the valley.

This decision forced Decker Coal to shift from its originally proposed dragline mining method to a truck/shovel/dragline operation. Decker Coal is presently being sued by the City of Austin regarding the price per ton charged by Decker Coal. Decker Coal raised its rates following resolution of the Deer Creek issue, stating that mining method changes had increased the cost of mining. Austin is contesting the increase.

Physical Environment

The East Decker area is drained by three streams, Deer Creek, Middle Creek, and Coal Creek. Deer Creek has a drainage area of about 50 square miles above the permit area. South of Deer Creek is a broad, upland area where slopes seldom exceed 15 percent. In the eastern part of the permit area, the upland rises across a series of irregularly dissected benchlands toward a highland, about 800 feet above the Tongue River Reservoir surface.

The East Decker area is underlain by all or part of three separate surface minable coal beds of the Tongue River member: the Anderson (D-1 upper), the Dietz 2 (D-1 lower), and Dietz 3 (D-2) seams (Fig. 1). Decker Coal names are noted in parentheses. The Dietz 3 underlies the entire area. The Dietz 2 underlies all but about four acres of the permit area. The Anderson underlies about half the mining area, and has been burned or eroded in the other areas.

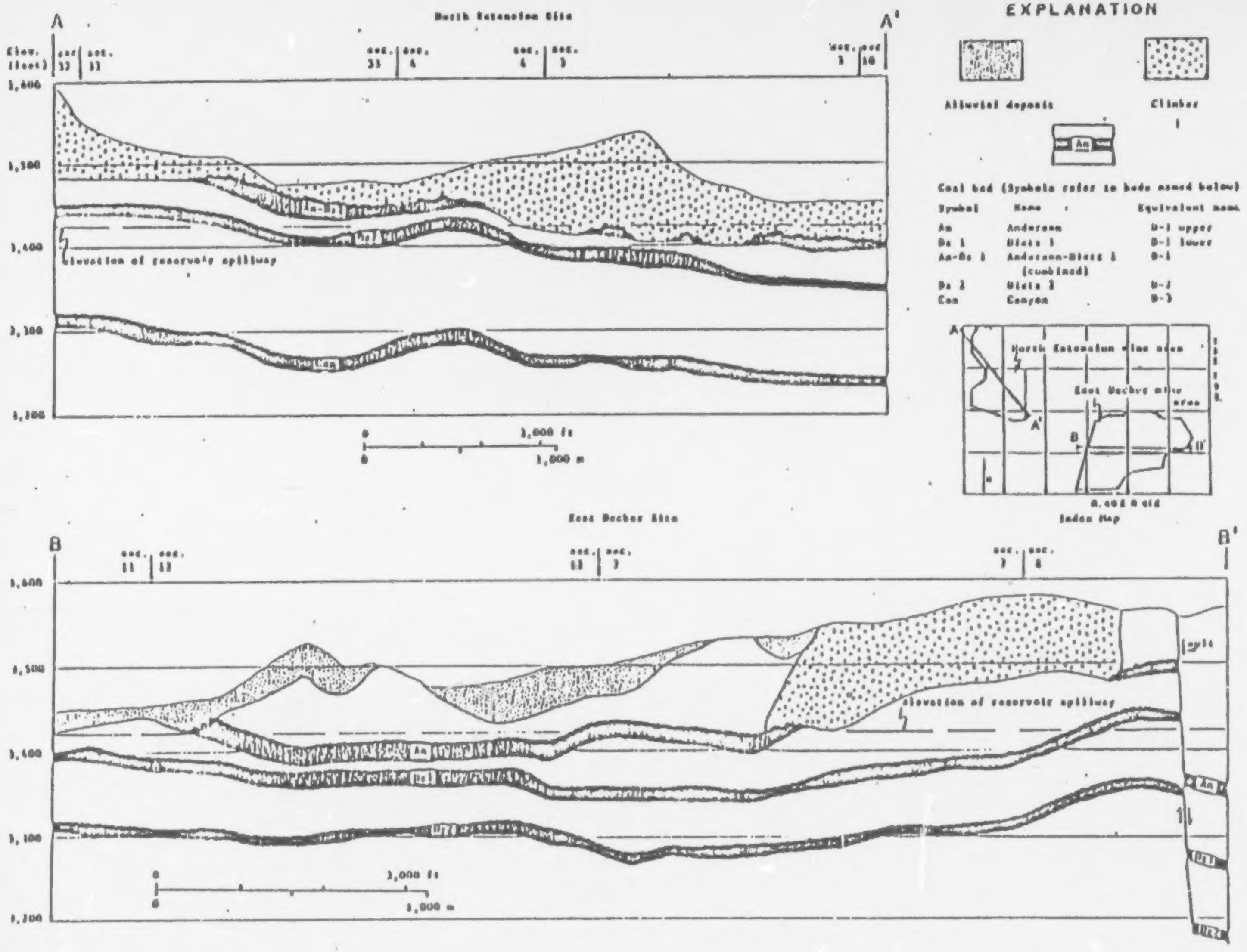

North Extension Site
A
A'
Elev. (feet)
sec. 32
sec. 33
sec. 33
sec. 4
sec. 4
sec. 3
sec. 3
sec. 10
3,600
3,500
3,400
3,300
3,200
An
Ds 1
Ds 2
elevation of reservoir spillway
0
1,000 ft
0
1,000 m
EXPLANATION
Alluvial deposit
Clinker
An
Coal bed (Symbols refer to beds named below)
Symbol Name Equivalent name
An Anderson D-1 upper
Ds 1 Dietz 1 D-1 lower
An-Ds 1 Anderson-Dietz 1 (combined) D-1
Ds 2 Dietz 2 D-2
Con Canyon D-3
A
A'
North Extension mine area
East Decker mine area
B
B'
Index Map
East Decker Site
B
B'
sec. 11
sec. 12
sec. 12
sec. 7
sec. 7
sec. 8
3,600
3,500
3,400
3,300
3,200
elevation of reservoir spillway
fault
An
Ds 1
Ds 2
0
1,000 ft
0
1,000 m

Figure 1 - Cross sections through the proposed mine areas, Decker area, Montana. (USGS, 1977)

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Mining and Reclamation: Methods and Issues

Overburden and interburden are excavated by shovels in benches of various widths in vertical lifts no greater than 50 feet in height. The shovels load end-dump trucks which haul spoils either to out-of-pit stockpiles or to mined-out pit areas. A dragline removes the lowest interburden material and casts it into the mined-out pit floor.

The only major regulatory issue which has not yet been resolved is whether Deer Creek is an alluvial valley floor and if it is, if the operation has an effect on the valley. Before East Decker can receive approval for its pending 5-year permit renewal and life-of-mine plan, it must be demonstrated that the operation will not adversely affect Deer Creek, if the valley is an alluvial valley floor.

REFERENCES

U. S. Geological Survey and Montana Department of State Lands. 1977. Final environmental impact statement proposed plan of mining and reclamation, East Decker and North Extension Mines, Decker Coal Company, Decker, Montana: 2 vols.

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
EAST DECKER MINE	DECKER COAL CO.[1]	M-073093	9409.6a	9S40E 1, 13, 14 8 S41E 31-34 9 S41E 3-10, 15, 17, 18	8/1/66	$1.00/a	20¢/TON	PRODUCING

[1] Original Lessee: Peter Kiewit Son's Co. Assignment on 9/1/1971

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
EAST DECKER MINE	DECKER COAL CO.	M073093	TOTAL PERMITTED: 4145			TRUCK/ SHOVEL, DRAGLINE	PRODUCING	6.7 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE:

RECOVERABLE:

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

6 STATE COAL LEASES

2 PRIVATE LEASES

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: MONTANA REGION: POWDER RIVER COUNTY: BIG HORN

MINE NAME OR LEASE BLOCK EAST DECKER MINE	LESSEE(S) DECKER COAL CO.	NUMBER OF LEASES 1	DATE MINE OPENED: 1978 PROJECTED CLOSING DATE: 2007+ REMAINING MINE LIFE: 27+ YRS
REMAINING RECOVERABLE RESERVES: FEDERAL: — NON-FEDERAL: —		MINE DESIGN CAPACITY 6.7 MTY RECOVERY RATE: 90%	CUMULATIVE PRODUCTION TO 1979: — 1979 ACTUAL PRODUCTION: 5,897,433 T

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	5.7		5.7[1]
1981	6.0		6.0
1982	6.0		6.0
1983	6.0		6.0
1984	6.0		6.0
1985	6.0		6.0
1986	6.0		6.0
1987	6.6		6.0
1988	6.6		6.6
1989	6.6		6.6
1990	6.6		6.6
Post 1990	6.6		6.6

NOTES:

[1] sold to Lower Colorado River Authority, Austin, and Commonwealth Edison, Chicago.

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: MONTANA

REGION: POWDER RIVER

COUNTY: BIG HORN

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
EAST DECKER MINE	DECKER COAL CO.	1	TRUCK/SHOVEL, DRAGLINE

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	ROLAND	SMITH	D-1 UPPER	D-1 LOWER	D-2			
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS							
THICKNESS	9-10	12.5-13.5	24.7	14-19	13.23			
BTU/LB	8653	8653	9296	9703	9175			
SULFUR (%)	0.30	0.55	0.48	0.47	0.39			
ASH (%)	3.87	6.25	4.36	3.67	5.82			
MOISTURE (%)	29.85	26.33	24.54	23.66	24.43			
FIXED CARBON (%)	35.60	36.29	40.00	40.34	40.14			
VOLATILE (%)	30.68	31.13	31.19	32.51	29.21			
SEAM DEPTH								
IN-PLACE RESERVES								
RECOVERABLE RESERVES	0	0	62.5	62.9	47.9			
RECOVERY RATE	0	0	90%	90%	90%			

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL			172.6	
	SURFACE			172.6	
	UNDERGROUND				

NOTES:

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Buckskin Mine

Lease Number(s): W0325878

Location: Campbell County, Wyoming

Lessee: Shell Oil Company

Operator: Shell Oil Company

Proximity to Other Operations: Rawhide Mine is adjacent to south

First Coal Shipped: 1981

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 6.2 mty

Remaining Mine Life: 15 years

Mining Method: Truck/shovel

Recovery Rate: 95%

Permitted Mine Plan Area: 1,467 acres

Federal Lease Area Associated with Mine Plan: 600 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 104

Rank: Subbituminous

BTU/lb: 8,177

Sulfur (%):0.51

Overburden Thickness: 101 ft

Overburden/Coal Ratio:

Reserves:

Total recoverable permitted mine plan (mt): 43

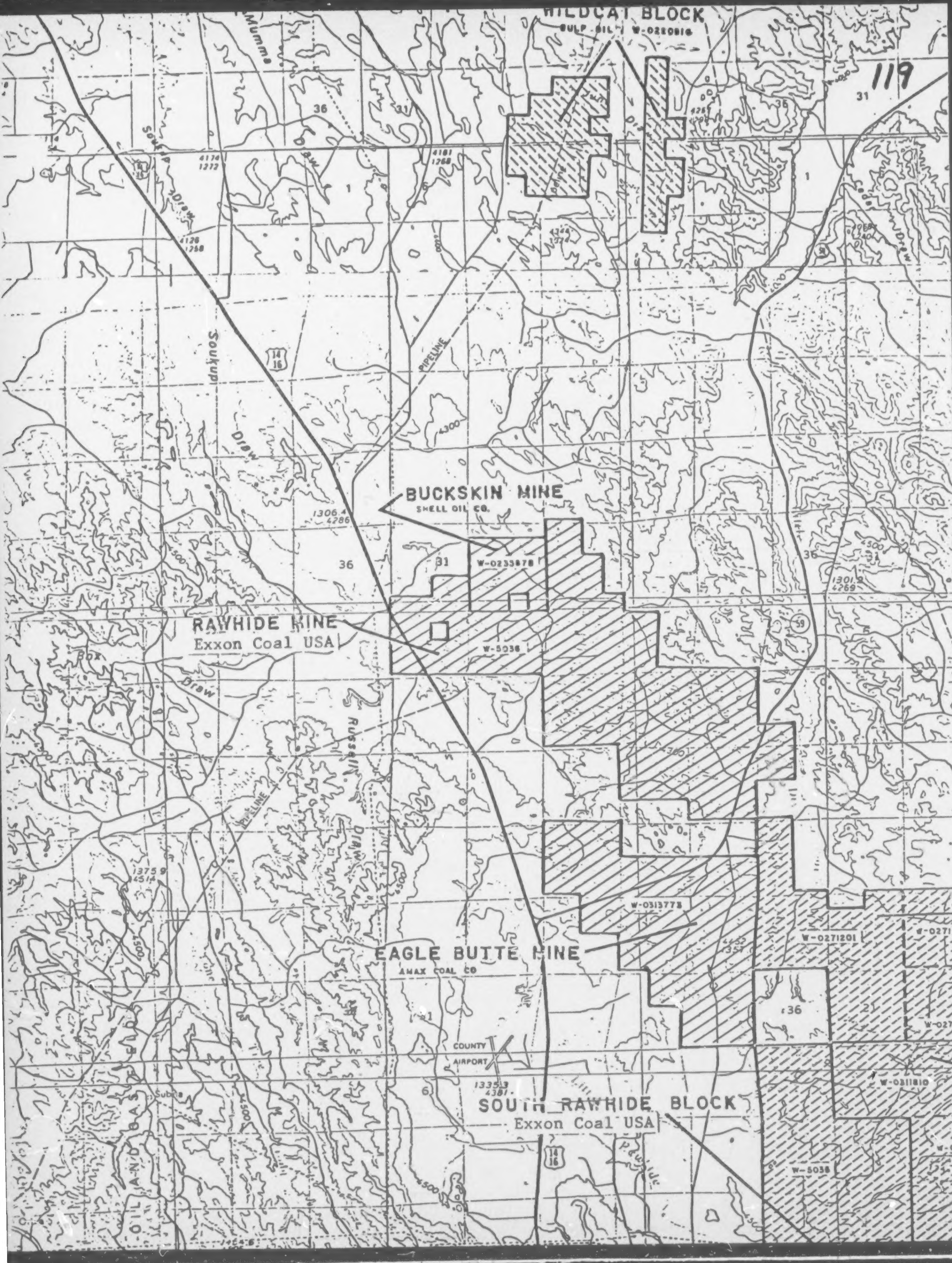
Total recoverable permitted federal in mine plan (mt): 43

Total recoverable federal in leaseblock: 79

Notes:

If Shell can demonstrate that it can effectively reclaim the designated alluvial valley floors of Rawhide Creek and Spring Draw, 36 million tons of recoverable coal underlying these valleys will be mined. The alluvial valley floor question has significantly affected Shell's mining method and, reportedly, its coal mine contracts. Shell Oil reports that it committed 79 million tons of coal to three different utilities before the alluvial valley floor issue arose. Unless Shell finds an additional source of coal, either through approval to mine and reclaim Rawhide Creek and Spring Draw or by supplying coal from another property, the company may have to renegotiate its contracts.

Shell states that it must obtain approval to mine the valley areas by 1983, or else mining of these reserves will become difficult, if not impossible.


WILDCAT BLOCK
GULF OIL W-0260816
BUCKSKIN MINE
SHELL OIL CO.
W-0233878
RAWHIDE MINE
Exxon Coal USA
W-5036
EAGLE BUTTE MINE
AMAX COAL CO
W-0313773
W-0271201
W-0311810
SOUTH RAWHIDE BLOCK
Exxon Coal USA
W-5036
COUNTY AIRPORT
PIPELINE
PIPELINE
Soukup Draw
Box Draw
Russell Draw
Mumme
Rawhide
OIL AND GAS
Subra
59
14 16
14 16
36
31
1
36
31
1
36
31
36
6
1306.4 4286
1301.2 4269
1375.9 4514
1335.3 4381
4174 1272
4181 1268
4128 1258
4300
4500
4500

BUCKSKIN MINE

The Buckskin Mine occupies federal coal lease W-0325878, located about 11 miles north of Gillette, Wyoming. The operation, as being developed by Shell Oil Company, includes one year of pre-construction activities and initial production in 1981 of about 200,000 tons. Shell projects that production during 16 years' operation will reach 6.15 million tons, with a total of 43 million tons removed from the mine area. (U. S. Office of Surface Mining, 1980) Contracts for coal from this mine have been signed with Cajun Electric Power Cooperative, Missouri Basin Power Project and Western Farmers Electric Cooperative. (Glass, 1980, p. 89)

Background

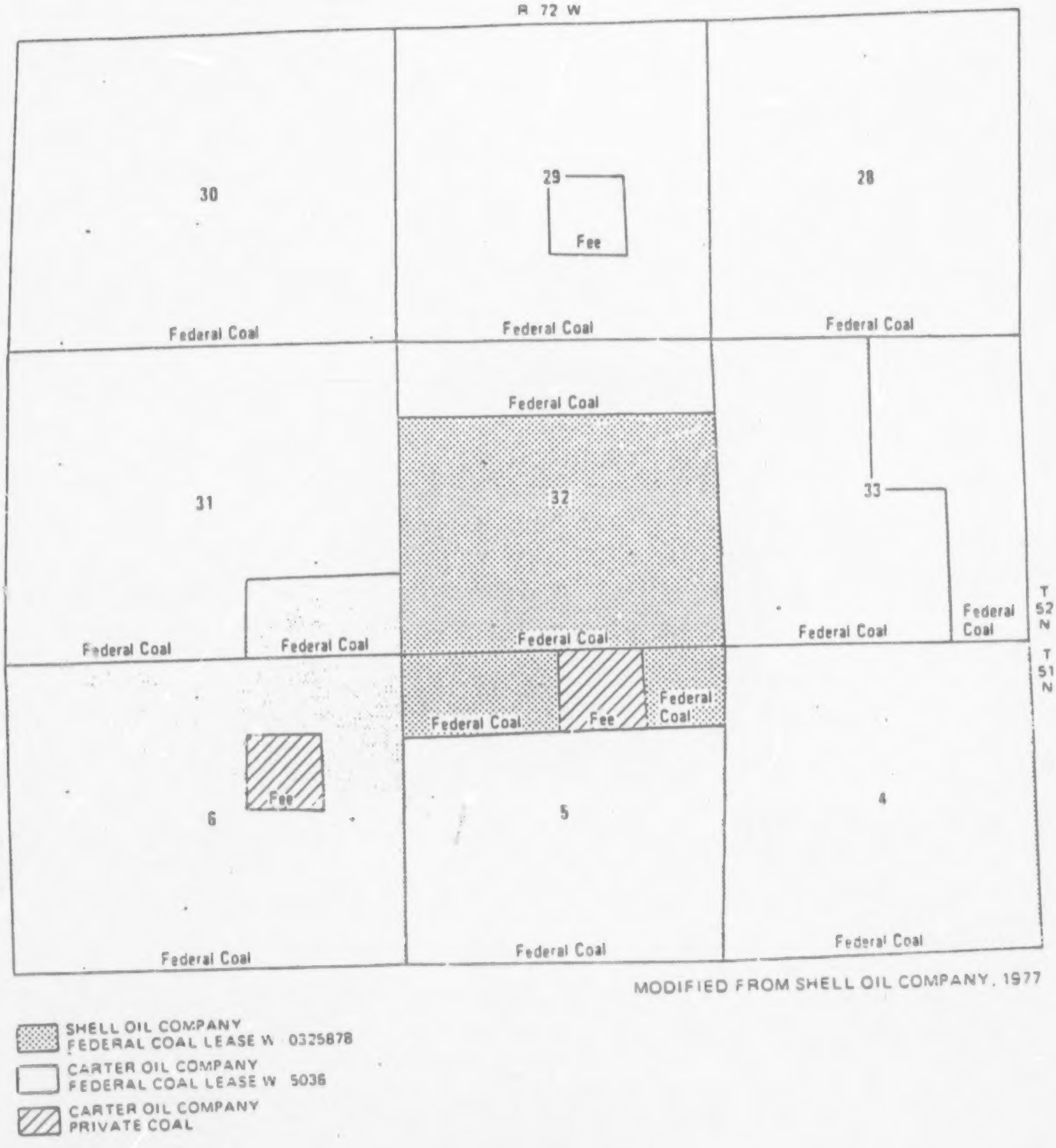
In November 1967, federal coal lease W-0325878 was issued to Farmers Union Central Exchange, which sold the rights to Shell Oil Company in May 1975. The surface area over the coal lease, which consists of 600 acres, was subsequently purchased from Carter Oil Company in 1976. A Shell Oil Company and Carter Oil Company easement agreement for a 1000-foot perimeter peripheral to the coal lease was finalized in November 1976. In 1977, the U. S. government rejected Shell Oil's proposal that an additional 320 acres adjacent to W-0325878 be leased.

Shell submitted a mining and reclamation plan to the U. S. Geological Survey (USGS) and the Wyoming Department of Environmental Quality (WDEQ) in May 1977. Environmental impacts associated with the mining operation as proposed in Shell's mining and reclamation plan were analyzed as a site-specific proposed action by the Bureau of Land Management in the

Eastern Powder River Basin Environmental Impact Statement (1979). The EIS addressed impacts associated with removing 80 million tons of coal from the lease area as was originally proposed in Shell's mining and reclamation plan. (U. S. Office of Surface Mining, 1980)

In November 1978, Shell Oil Company submitted a revised mining plan to the USGS and WDEQ to comply with newly implemented Surface Mining Act requirements. The U. S. Office of Surface Mining (OSM) review of Shell's revised plan resulted in the designation of parts of the leased area as potential alluvial valley floors. Rather than delay mine development until further environmental, mining, and reclamation studies were undertaken, Shell submitted another revised mining and reclamation plan in August 1979 which proposed the removal of only that coal outside of alluvial valley floor areas. Thus, only 43 of the 79 million tons of recoverable coal were proposed for removal from the lease area. The State of Wyoming and the OSM approved the plan in 1980. The total permitted acreage, including access road and railroad spur, is 1,467.0 acres (Figs. 1 and 2).

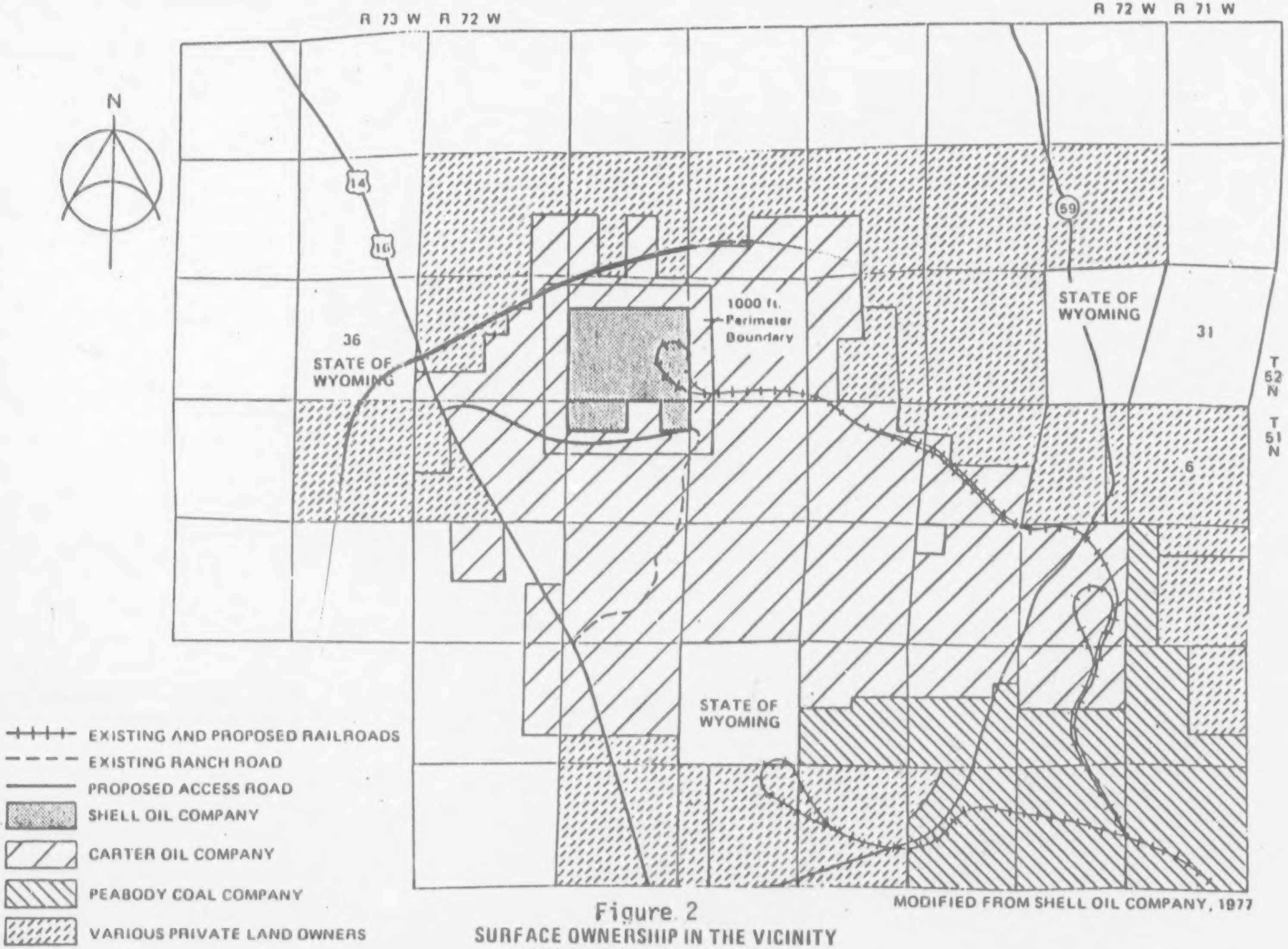
Subsequently, OSM designated Rawhide Creek and Spring Draw as alluvial valley floors and studies are now underway to determine whether the area can be reclaimed successfully. The designated alluvial valley floors cover 358 acres. The alluvial valley floor designation appears to have had a dramatic effect on Shell Oil Company's mining method. The approved mine plan calls for mining coal from two separate pits. The smaller of the two pits will only supply coal for four years. Previously, Shell had planned to produce coal from one large pit. (U. S. Office of Surface Mining, 1980)


R 72 W
30
29
Fee
28
Federal Coal
Federal Coal
Federal Coal
Federal Coal
31
32
33
Federal Coal
Federal Coal
Federal Coal
Federal Coal
Federal Coal
T 52 N
T 51 N
Federal Coal
Fee
Federal Coal
Fee
6
5
4
Federal Coal
Federal Coal
Federal Coal
▨ SHELL OIL COMPANY FEDERAL COAL LEASE W 0325878
☐ CARTER OIL COMPANY FEDERAL COAL LEASE W 5036
▨ CARTER OIL COMPANY PRIVATE COAL

MODIFIED FROM SHELL OIL COMPANY, 1977

Figure 1
COAL OWNERSHIP IN THE VICINITY
OF THE BUCKSKIN PROJECT

U.S.BLM,1979, Fig.BU1-5


R 73 W
R 72 W
R 72 W
R 71 W
N
14
16
59
36
STATE OF WYOMING
1000 ft. Perimeter Boundary
STATE OF WYOMING
31
T 52 N
T 51 N
6
STATE OF WYOMING
┼┼┼┼ EXISTING AND PROPOSED RAILROADS
– – – – EXISTING RANCH ROAD
—— PROPOSED ACCESS ROAD
▩ SHELL OIL COMPANY
▨ CARTER OIL COMPANY
▧ PEABODY COAL COMPANY
▨ VARIOUS PRIVATE LAND OWNERS

MODIFIED FROM SHELL OIL COMPANY, 1977

Figure 2
SURFACE OWNERSHIP IN THE VICINITY OF THE BUCKSKIN PROJECT

U.S.BLM,1979, Fig. BU1-4

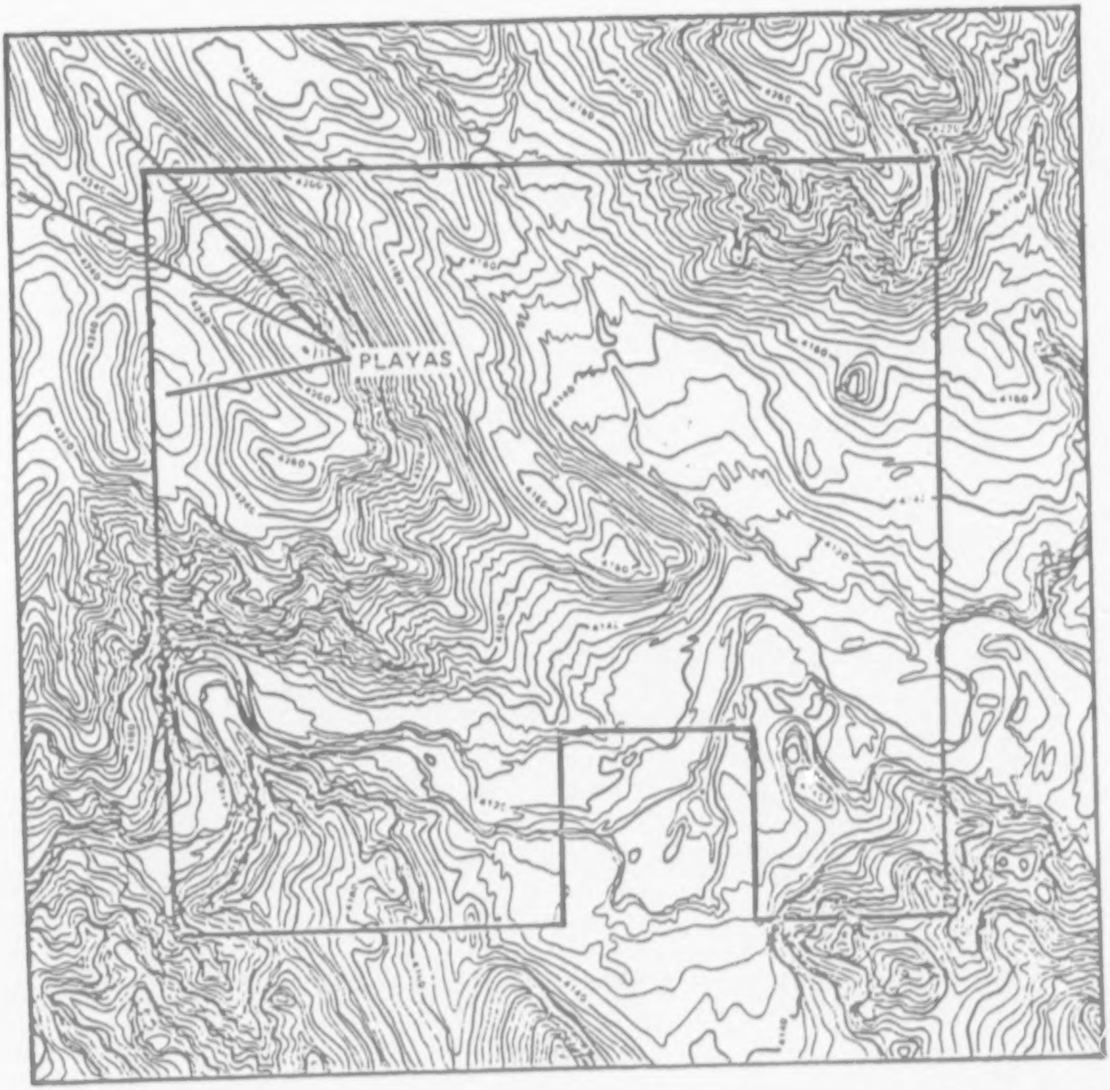
Shell had committed the full complement of recoverable coal reserves (79 mt) in contracts to three different utilities. Two of the contracts were signed in 1979, less than eight months before Shell submitted its revised mining plan. Because Shell only has submitted plans to mine the coal not found under areas designated as alluvial valley floors, Shell Oil Company may need to find an additional source of coal production or else must renegotiate its utility contracts. (Glass, 1980)

Presently, Shell Oil is developing a plan whereby the stream valley may be mined and reclaimed by demonstration that the essential hydrologic functions of the alluvial valley floors can be restored.

If approval to mine Rawhide Creek and Spring Draw is not obtained by 1983, mining of the valleys would not be feasible according to the present mining plan. If Shell does not recover this coal, another company could possibly mine this area as a logical mining unit. However, the area around the alluvial valley floors would have to be redisturbed. (U. S. Office of Surface Mining, 1980)

Physical Environment

The mine site is characterized by low, rolling hills dissected by intermittent drainages. In the northern part of the site, the land slopes gently southward, and in the southern part gently northward into Rawhide Creek, the main drainage. Rawhide Creek is an intermittent stream which flows from west to east across the southern part of the site. Spring Draw, the main tributary of Rawhide Creek in the lease area, is ephemeral. It flows from northwest to southeast and joins Rawhide Creek along the southeast edge of the lease (Fig. 3).



MODIFIED FROM SHELL OIL COMPANY 1977

Figure 3
TOPOGRAPHIC MAP OF THE BUCKSKIN MINE AREA

U.S. BLM, 1979, Fig.BU2-2

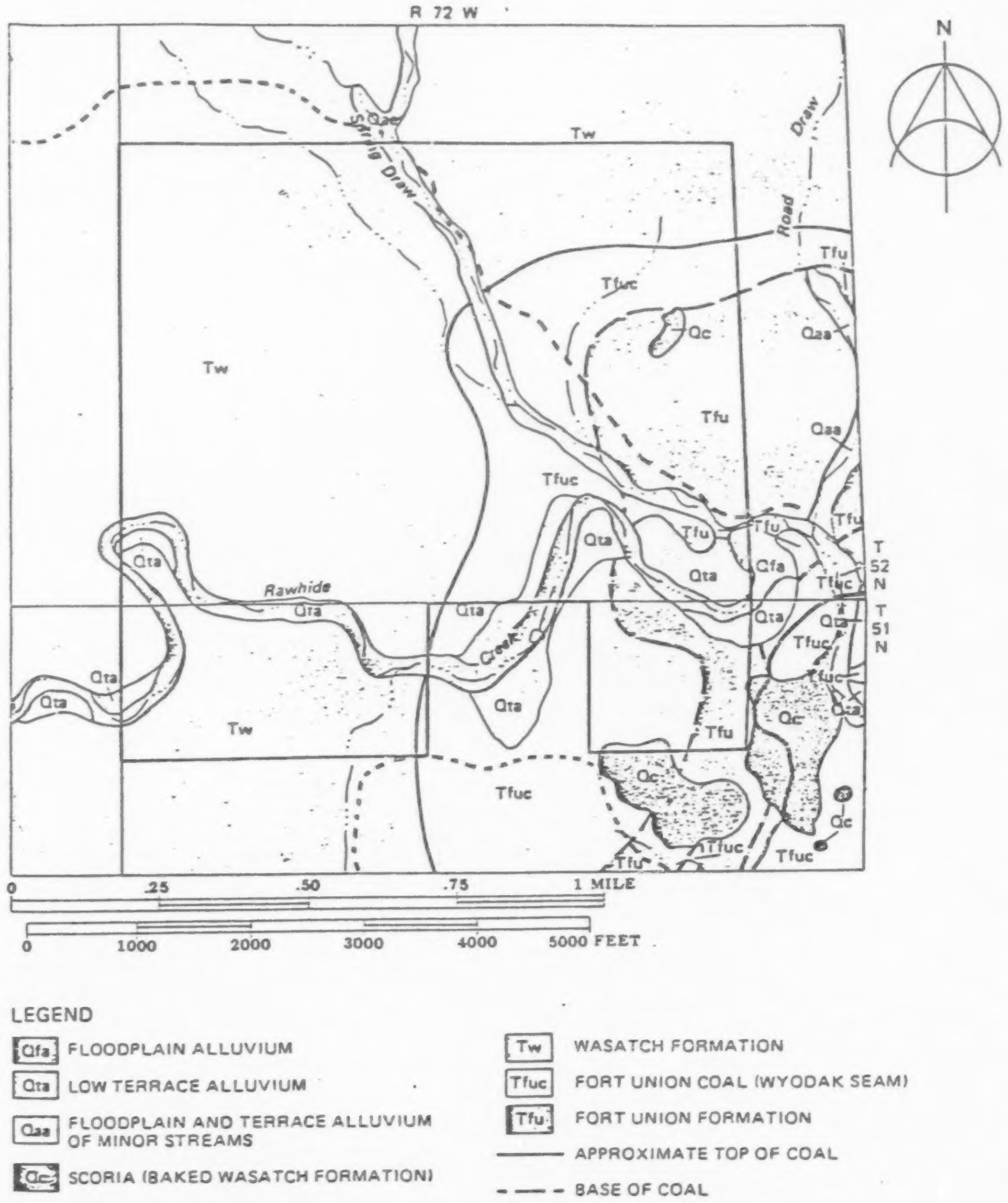
Geologic formations that are exposed in the lease area are the Paleocene Fort Union formation, the Eocene Wasatch formation, and Quaternary alluvium. The Fort Union formation below the coal consists of brown and dark gray to black carbonaceous shale and siltstone interbedded with light gray, fine-grained, friable sandstone and thin coal beds. The Anderson-Canyon coal seam, which is to be mined, is at the top of the Fort Union formation and averages 104 feet in total thickness in the lease area. The Wasatch formation above the coal consists of shale, sandy shale, and soft lenticular sandstone. It varies from 20 to 215 feet in thickness (Fig. 4).

Minable coal found on the lease is located in the Anderson-Canyon seam. There is a thin coal stringer found in the northwest corner of the mine plan. Shell Oil has stated that the company will recover this seam if the seam exceeds three feet in thickness and is of marketable quality. (Shell Oil Company, 1980)

Mining and Reclamation Methods

Mining will take place in two separate pits, one on each side of Rawhide Creek. The smaller pit on the south side of the creek will be opened first, and will be reclaimed by the end of 1987. The north pit will be opened in 1982 (Fig. 5). The Buckskin Mine will operate as a "thin overburden" surface coal mine. Overburden and coal removal will be accomplished primarily with trucks and shovels. Topsoil will normally be handled with scrapers; however, front-end loaders and trucks may be used on occasion. (Shell Oil Company, 1980)

The mining sequence will develop a working face by removing the overburden with a 20-cubic yard shovel and front-end loaders and 100-ton trucks.


R 72 W
N
Tw
Qae
Spring Draw
Road Draw
Tfu
Tfuc
Qc
Qaa
Tfu
Qaa
Tfuc
Tfu
Tfu
Tfu
Qta
Qta
Qfa
Tfuc
T 52 N
T 51 N
Qta
Rawhide
Qta
Qta
Creek
Qta
Qta
Qta
Tfuc
Tfuc
Qc
Qaa
Qta
Qta
Tw
Qta
Tfu
Tfuc
Qc
Qc
Tfu
Tfuc
Tfuc
0
.25
.50
.75
1 MILE
0
1000
2000
3000
4000
5000 FEET
LEGEND
Qfa FLOODPLAIN ALLUVIUM
Qta LOW TERRACE ALLUVIUM
Qaa FLOODPLAIN AND TERRACE ALLUVIUM OF MINOR STREAMS
Qc SCORIA (BAKED WASATCH FORMATION)
Tw WASATCH FORMATION
Tfuc FORT UNION COAL (WYODAK SEAM)
Tfu FORT UNION FORMATION
APPROXIMATE TOP OF COAL
BASE OF COAL

NOTE: Qfa is within the definition of alluvial valley floors according to the Surface Mining Control and Reclamation Act of 1977 (SMCRA). Qta and Qaa are included, but must be studied in greater detail to determine how much of their area falls within the SMCRA definition. Figure is modified from Williams, 1978.

Figure 4
SIMPLIFIED GEOLOGIC MAP OF BUCKSKIN MINE SITE

U.S.BLM.1979.Fig.BU2-4

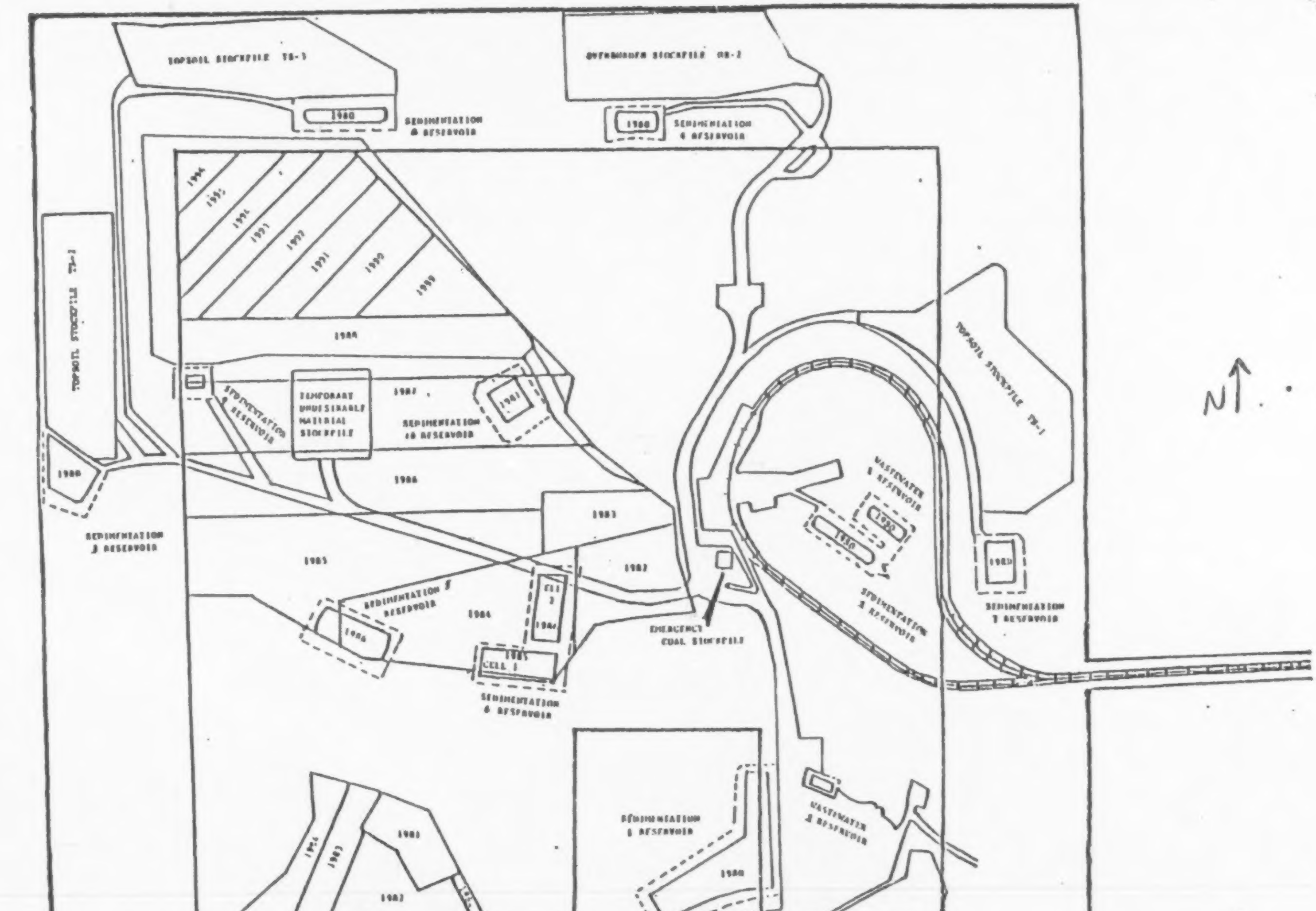

TOPSOIL STOCKPILE TS-1
OVERBURDEN STOCKPILE OB-2
1980
SEDIMENTATION 8 RESERVOIR
1980
SEDIMENTATION 4 RESERVOIR
TOPSOIL STOCKPILE TS-2
1994
1993
1992
1991
1990
1991
1990
1989
1988
SEDIMENTATION 9 RESERVOIR
TEMPORARY UNDESIRABLE MATERIAL STOCKPILE
1987
SEDIMENTATION 10 RESERVOIR
1987
1980
SEDIMENTATION 3 RESERVOIR
1986
1983
1985
1982
SEDIMENTATION 5 RESERVOIR
1984
1986
CELL 2
1984
1985
CELL 1
SEDIMENTATION 6 RESERVOIR
EMERGENCY COAL STOCKPILE
TOPSOIL STOCKPILE TS-1
WASTEWATER 1 RESERVOIR
1980
1980
SEDIMENTATION 2 RESERVOIR
1980
SEDIMENTATION 7 RESERVOIR
N
SEDIMENTATION 1 RESERVOIR
1980
WASTEWATER 2 RESERVOIR
1984
1983
1981
1982
OVERBURDEN STOCKPILE OB-1

Figure 5 - APPROXIMATION OF MINE PLAN AREA

U.S. OSM,1980,Fig.2

Overburden will be stockpiled until sufficient room is developed to establish a haul-back system. As the coal is exposed, it will be drilled, blasted and loaded into 100-ton trucks by a large backhoe and front-end loaders. The backhoe is used to remove the coal from the bottom bench of the pit to avoid running the equipment on the wet clay bottom. After sufficient working room is developed, the topsoil and overburden will be hauled back and replaced in routine fashion. The overburden will be hauled back around the pit and end-dumped in two lifts.

REFERENCES

Glass, Gary B. 1980. Wyoming coal productions and summary of coal contracts: Geological Survey of Wyoming, Public Information Circular No. 12, 99 p.

Shell Oil Company. 1980. Revised Buckskin Mine mining permit application: 10 vols.

U. S. Bureau of Land Management. 1979. Final environmental statement, Eastern Powder River Coal: 2 vols.

U. S. Office of Surface Mining. 1980. Environmental assessment, addendum to OSM's technical analysis of Shell Oil Company's Buckskin Mine: 27 p.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
BUCKSKIN MINE	SHELL OIL CO.[1]	W-0325878	600	51N72W5 52N72W32	11/1/67	$1.00	20¢/TON	PRODUCING

[1] Original lessee Farmers Union Central Exchange, Inc.
Assigned 5/1/1975

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
BUCKSKIN MINE	SHELL OIL CO.	W-0325878	1467 a	COAL 600	0	TRUCK/ SHOVEL	PRODUCING	6.2
				SURFACE 0	1467a			

MINE PLAN OR LEASE BLOCK RESERVES:

MINEABLE: 84

RECOVERABLE: 79*

SOURCE: US OSM, 1980

ASSOCIATED LEASES WITH REASONS WHY:

NONE

*43 MT WILL BE RECOVERED UNDER APPROVED MINE PLAN

All Figures Shown in Million Tons

COMMENTS:

[1] Carter Oil Company which owns the surface of the lands surrounding the lease has granted the right of encroachment to Shell on Lot 2, Section 5, T51N, R72W and upon a 1000 ft corridor around the entire perimeter of the lease area for mine-related activities. Almost all coal rights in these fringe areas are owned by the federal government although much of this coal has been leased to Carter Oil Company (The 40 acre sector in lot 2, Section 5 is private fee coal held by Carter Oil) (U.S. DOI, p. BU1-3)

STATE: WYOMING　　REGION: POWDER RIVER　　COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK BUCKSKIN MINE	LESSEE(S) SHELL OIL CO.	NUMBER OF LEASES 1	DATE MINE OPENED: 1981 PROJECTED CLOSING DATE: 1996 REMAINING MINE LIFE: 15 YR.
REMAINING RECOVERABLE RESERVES: FEDERAL: 79 NON-FEDERAL: 0	MINE DESIGN CAPACITY 6.2 MTY[1] RECOVERY RATE: 95%		CUMULATIVE PRODUCTION TO 1979: 0 1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	0		
1981	0.2[1,2]		.2[3]
1982	1.45		1.45
1983	1.15		1.45
1984	6.15		6.15
1985	6.15		6.15
1986	6.15		6.15
1987	6.15		6.15
1988	4.60[4]		4.6[4]
1989	1.45		1.45
1990	1.45		1.45
Post 1990	1.45 - (91-93) 1.2 - (94-96)		1.45 1.2

NOTES:

[1] Reiter, 1980

[2] Buckskin Mine Employment Est. Letter to Bane Bickley; Community Planner DOI/OSM - Attachment to Buckskin Mine Environmental Assessment, US/OSM 1980, and Shell oil Co., 1980, Vol IX, p. 33

3. All production is contracted

[4] If additional reserves are permitted, production will stay at 6.15

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING

REGION: POWDER RIVER

COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
BUCKSKIN MINE	SHELL OIL CO.	1	TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	ANDERSON/CANYON (WYODAK)							
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS C							
THICKNESS	104							
BTU/LB	8177							
SULFUR (%)	0.51							
ASH (%)	6.17							
MOISTURE (%)	29.80							
FIXED CARBON (%)	32.88							
VOLATILE (%)	31.15							
SEAM DEPTH	20 - 215							
IN-PLACE RESERVES	84							
RECOVERABLE RESERVES	79							
RECOVERY RATE	95%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL	84	0	84	U.S. OSM, 1980
	SURFACE	84	0	84	
	UNDERGROUND	0	0	0	
RECOVERABLE:	TOTAL	79	0	79 *	
	SURFACE	79	0	79	
	UNDERGROUND	0	0	0	

NOTES:

* 36 MT recoverable reserves underlying designated alluvial valley floors are presently not propoced for recovery.

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Rawhide Mine

Lease Number(s): W5036

Location: Campbell County, Wyoming

Lessee: Exxon Coal USA, Inc. (Exxon, Inc.)

Operator: The Carter Mining Company

Proximity to Other Operations: Buckskin Mine is adjacent on north, Eagle Butte is adjacent on south

First Coal Shipped: 1977

1979 Production: 3.6 mt

1980 Production: 4.5 mt

Ultimate Mine Design Capacity: 24 mty

Remaining Mine Life: 25 years

Mining Method: Dragline, truck/shovel

Recovery Rate: 90%

Permitted Mine Plan Area: 7,392.9 acres

Federal Lease Area Associated with Mine Plan: 4,977.5 acres

Pending Actions: None

Coal Data

Seam Name(s): Wyodak (Anderson-Canyon)

Thickness (ft): 104

Rank: Subbituminous

BTU/lb: 8227

Sulfur (%): 0.34

Overburden Thickness: 111 ft

Overburden/Coal Ratio: 1.13

Reserves:

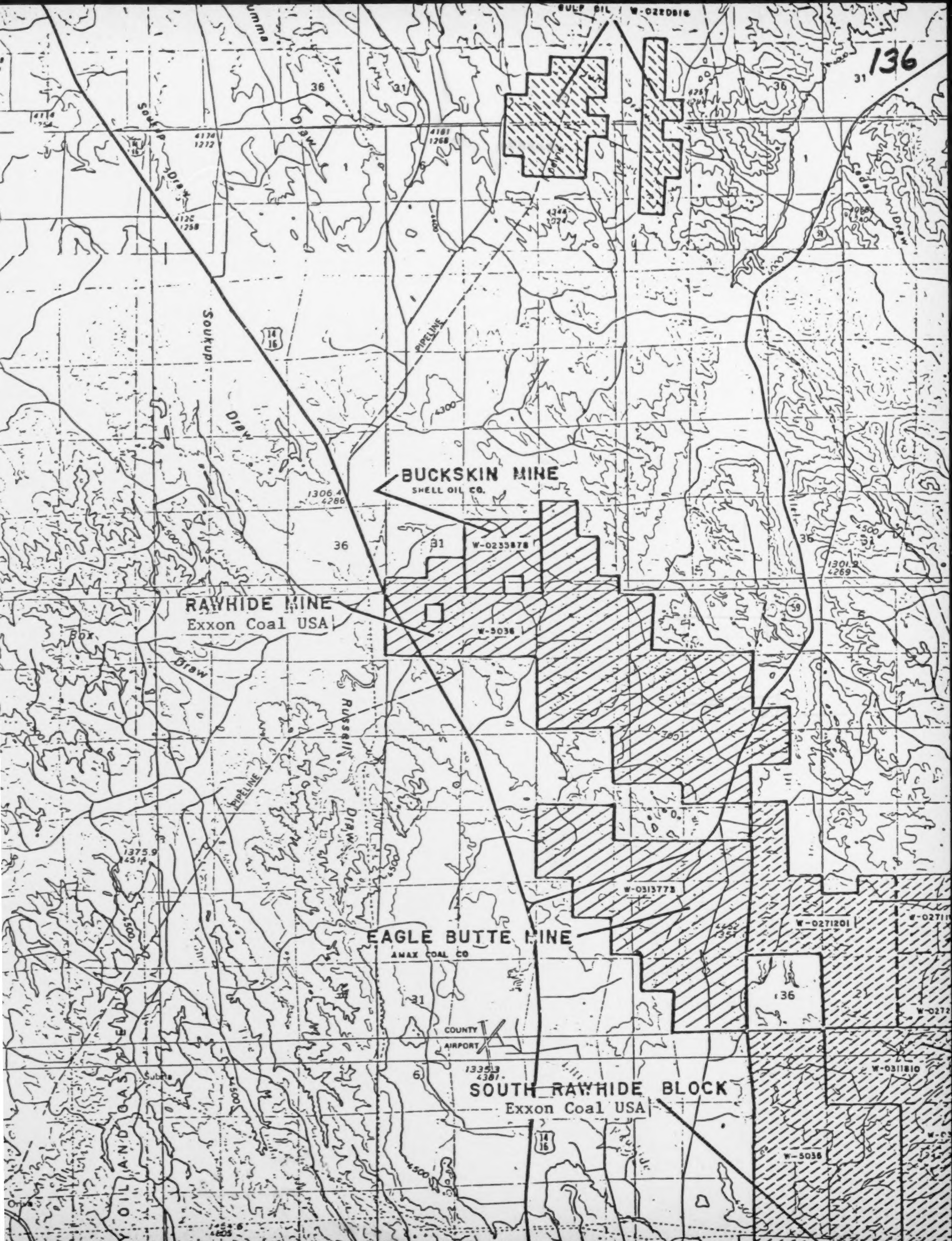
Total recoverable permitted mine plan (mt): 525

Total recoverable permitted federal in mine plan (mt): 525

Total recoverable federal in leaseblock: 615.9

Notes:

State of Wyoming and U. S. OSM approved increase in mine plan area from 5992.6 to 7392.9 acres, and increase in projected peak production to 24 mty. In order to accomplish peak production, Carter Mining will have to construct two additional silos and a second railroad loop. "Highly variable" coal quality between the two target seams may necessitate construction of a blending facility by 1983, expected to be operational by 1985. A two-pit mining sequence is already underway to provide some blending flexibility. Determinations have been made that parts of Rawhide and Little Rawhide Creeks are alluvial valley floors. Before mining is approved for these areas, Carter Mining will have to demonstrate that the essential hydrologic functions of the streams can be reestablished.


GULF OIL
W-0220816
Soukup Draw
Soukup Draw
Draw
PIPELINE
PIPELINE
4300
BUCKSKIN MINE
SHELL OIL CO.
W-0233878
1306.4
4286
RAWHIDE MINE
Exxon Coal USA
W-5036
Box
Draw
Russell
Draw
1301.9
4269
59
W-0313773
EAGLE BUTTE MINE
AMAX COAL CO
W-0271201
W-0271
W-0311810
W-5036
COUNTY
AIRPORT
1335.3
4381
1375.9
4514
SOUTH RAWHIDE BLOCK
Exxon Coal USA
14
16
OIL AND GAS
Cedar Draw
36
31
1
36
31
36
1
36
31
6
31
36

RAWHIDE MINE

The Carter Mining Company, a wholly-owned subsidiary of Exxon, Inc., operates the Rawhide Mine, nine miles north of Gillette, Wyoming. Topsoil stripping began in December 1976 and the first coal was shipped in August 1977. In 1980, the State of Wyoming and the U. S. Office of Surface Mining (OSM) approved Carter Mining's application, Amendment No. 2, which increased the mine plan area from 5,992.6 acres to 7,392.9 acres and doubled the peak mine capacity to 24 mty (million tons per year).

The approved mine plan is solely focused on development of the reserves of federal lease W-5036, originally awarded to Humble Oil and Refining Company in December 1967. The lease is now held by Exxon Coal USA, Inc., a wholly-owned subsidiary of Exxon, Inc.

Physical Environment

The Rawhide Mine is located on the east flank of the Powder River coal basin. Rock units dip toward the west at a rate of 1^o to 2^o. The terrain in the vicinity of the Rawhide Mine site is characterized by irregular ridges and some isolated hills, separated by narrow to moderately-wide valleys. Most of the topographic highs are a result of clinker resistance to erosion. Elevations in the area range from 4,060 feet along Rawhide Creek to 4,434 feet in the southeastern part of the permit area. Maximum relief at any specific ridge is about 200 feet.

The Rawhide Mine is drained by the Dry Fork of the Little Powder River, Rawhide Creek, and Little Rawhide Creek. Rawhide Creek is intermittent and drains west to east across the permit area. Little

Rawhide Creek is also intermittent and drains northward through the center of the permit area. Dry Fork of Little Powder River is perennial and flows to the north along the eastern edge of the permit area.

On the mine site, the Eocene age Wasatch formation crops out over most of the area. Quaternary deposits fill stream valleys and clinker is found in many areas. Underlying the Wasatch at depths of 10 to over 300 feet is the Tongue River member of the Fort Union formation. The top of the Tongue River member is marked by the Wyodak seam. The Wyodak seam is separated by a clay parting which attains a thickness of about 150 feet, but averages six feet in thickness on the mine property. Exxon Coal terminology describes the Wyodak above the parting as the Roland seam, and the Wyodak below the parting as the Smith seam; however, accepted terminology refers to the upper Wyodak as the Anderson and the lower Wyodak as the Canyon. A rider seam is occasionally found above the Anderson seam and may reach 50 feet in thickness. Average thickness for the Anderson is 24 feet and for the Canyon 80 feet. Drilling by the Carter Mining Company has not revealed any significant coal seams within 200 feet of the base of the Canyon seam. (The Carter Mining Company, 1981)

Mining and Reclamation: Methods and Issues

The approved mine plan can accommodate maximum production of 24 mty. If production goals are met, mining operations will cease in 2006 and final reclamation will be achieved in 2007. (The Carter Mining Company, 1981) Earlier mine plans had anticipated a peak capacity of 12 mty and a mine life of 40 years. (U. S. Bureau of Land Management, 1979) Overburden thickness varies from ten to 310 feet and the overall ratio of overburden to coal is about 1.13. Overburden stripping is accomplished in 45-foot benches using 22-yard electric shovels loading 170-ton trucks. Boxcut spoils from initial cuts have been placed in a spoil pile of 10.4 million bcy (bank cubic yards) of which 6.2 million bcy will be permanent. Two temporary out-of-pit spoil piles are planned. (The Carter Mining Company, 1981)

Coal is removed from the Anderson seam using a P&H 1900 shovel which dumps coal into trucks. The Canyon seam is worked in two benches; the upper bench is removed with a 295 Bucyrus-Erie 35-cubic yard shovel, while the lower bench is removed with a Marion 195M 20-cubic yard dragline.

A two-pit mining sequence has been developed. This sequence is being used because the coal quality between the two seams is highly variable and a two-pit scheme permits coal blending. In order to expand production to 24 mty, two additional silos, blending facilities, a second sampling plant, and a second railroad loop will be constructed on site.

During the regulatory review, it was determined that parts of Rawhide Creek and Little Rawhide Creek are alluvial valley floors and Dry Fork may be an alluvial valley floor. (U. S. Office of Surface Mining, 1980) The amendment was approved because it was determined that adverse impacts to Rawhide and Little Rawhide Creeks could be mitigated and that impacts to Dry Fork would be minimal. Approval of Amendment No. 2 permits mining for five years under the regular state and federal permitting process. Actual mining of Rawhide and Little Rawhide Creeks is not proposed until after the currently approved five-year period. Prior to actual disturbance of the valleys, Carter Mining will have to demonstrate the ability to restore the essential hydrologic functions of these areas.

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REFERENCES

The Carter Mining Company. 1981. Wyoming Mining Permit Application.

U. S. Office of Surface Mining. 1980. Technical Analysis and Environmental Assessment of the Rawhide Mine.

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
Rawhide	Exxon Coal USA	W5036	~~5697~~ * 49725a	51N72W3,4,5,6,9,10,11,14,15 12,13 52N 72W 31,33	12/1/1967	$1/a	$.20/ton	producing

* 480a as segregated from lease in 1981 to form W77230, Peabody Coal

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
Rawhide	Exxon Coal USA	W5036	7392.9a			truck/ shovel	producing	24mty

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 684mt

RECOVERABLE: 615.9mt

SOURCE: USOSM, 1981

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

[redacted]

fee coal 95.3a

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: *Wyoming* REGION: *Powder River* COUNTY: *Campbell*

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	
Rawhide	*Exxon Coal USA*	*1*	DATE MINE OPENED: *1977* PROJECTED CLOSING DATE: *2006* REMAINING MINE LIFE: *25 years*

REMAINING RECOVERABLE RESERVES:
FEDERAL: *615.4*
NON-FEDERAL: *0*

MINE DESIGN CAPACITY *24m/y*
RECOVERY RATE: *90%*

CUMULATIVE PRODUCTION TO 1979: *3.7 mt*
1979 ACTUAL PRODUCTION: *3.6*

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	*4.5*	*4.5*	
1981	*7.0*	*7*	
1982	*13*	*13*	
1983	*17*	*17*	
1984	*21*	*21*	*16 mty Rawhide → Caballo*
1985	*24*	*24*	↓
1986	*24*	*24*	
1987	*24*	*24*	
1988	*24*	*24*	
1989	*24*	*24*	
1990	*24*	*24*	
~~Post 1990~~ *1991-2006*	*24 m/y*	*24m/y*	

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Wyoming
REGION: Powder River
COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): Rawhide
~~LESSEE(S)~~ (~~OR~~ OPERATOR): Carter Mining
NUMBER OF LEASES IN BLOCK OR PLAN: 1
MINING METHOD: truck/shovel

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM
SEAM NAME	Anderson	Canyon	combined					
FORMATION	~	Fort Union	~					
RANK	~	subbituminous	~					
THICKNESS	24	80	104					
BTU/LB	8016	8286	8227					
SULFUR (%)	0.72	0.24	0.34					
ASH (%)	7.07	6.60	5.18					
MOISTURE (%)								
FIXED CARBON (%)								
VOLATILE (%)								
SEAM DEPTH								
IN-PLACE RESERVES								
RECOVERABLE RESERVES	149	434	583					
RECOVERY RATE	90%	90%	90%					

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL	—	—	—	
				684	
	SURFACE	684	0	—	
	UNDERGROUND	—	—		
RECOVERABLE:	TOTAL	525*	0	525*	
	SURFACE	525	0	525	
	UNDERGROUND	0	0	0	

NOTES: *101 mt inplace reserves not now proposed for mining, underlies alluvial valley floors

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

COAL CONTRACT INFORMATION

Surface

MINE NAME: RAWHIDE STRIP MINE

COMPANY: CARTER MINING COMPANY

COAL RESERVES: 600 million short tons

TOTAL CONTRACTED TONNAGE: 210 million short tons

MINE CAPACITY: 12 million short tons

CONTRACTED ANNUAL PRODUCTION: 7.8 million short tons

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
Indiana and Michigan Electric Power (AEP)	?Tanners Creek Plant, Lawrenceburg, IN 1015 MW; 2.0 myn tons/year On line in 1977	60 myn tons	2.0 myn tons	30 years	1977-2006		$15.74[1] (1977)	72.1¢	Contract may not be for this plant although some coal shipped in 1977; shipped through Cook barge terminal at Metropolis, IL; maybe going to other AEP plants; contract announced in 1974 did not specify plant name
Indiana and Michigan Electric Power (AEP)	?Project 2602 No. 1, ? location, ?IN 1300 MW; 3.0 myn tons/year Startup in 1983	75 myn tons[2]	3.0 myn[2] tons	30 years[2]	1982-2011[2]				May not be part of 1974 contract but this plant could account for committed tonnage
Indiana and Michigan Electric Power (AEP)	?Unspecified plant or plants	15 myn tons[2]							Balance of tonnage committed in 1974 contract; could also be used to extend length of other contracts
Iowa Public Service Co.	George Neal No. 4 (Sergeant Bluff) Salix, IA 576 MW; 2.0 myn tons/year Startup in 1979	40 myn tons	2.0 myn tons	20 years	1979-1998				Five year contract with 15 year option; contract announced in 1978; plant jointly owned by Iowa Public Service Co. and Corn Belt Coop.(278 MW),

Notes: [1] FERC data [2] Estimated

COAL CONTRACT INFORMATION

MINE NAME: RAWHIDE ~~STRIP~~ surface MINE (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
									Interstate Power Co. (100 MW), Northwestern Public Service Co. (50 MW), Northwest Iowa Power Coop. (100 MW) and various municipalities; 1979 rail rate $10.69
Kansas City Board of Public Utilities	Nearman No. 1, Kansas City, KS 235 MW; 0.8 myn tons/year Startup in 1980	20 myn tons	0.8 myn tons	25 years	1980-1999				Contract negotiated by Western Fuels Assoc., Inc. and announced in 1978; Unit 2 (310 MW) planned for 1986, but coal supplier unknown

Notes:

COAL CONTRACT INFORMATION

MINE NAME: RAWHIDE ~~STRIP~~ surface MINE (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
SPOT SALES									
Tennessee Valley Authority	Unspecified plants	0.2 myn tons[2]		short	1978-1979				Spot sale during strike
Union Electric Co.	Sioux Plant, West Alton, MO 904 MW; 2.0 myn tons/year On line			short	1978-1979		$22.30[1] (1978)	136.0¢	Spot sale during strike

Notes:

Mine Name: Eagle Butte Mine

Location: Campbell County, Wyoming

Lease Number(s): W0313773

Lessee: AMAX Coal Company
(AMAX, Inc.)
Operator: AMAX Coal Company

Proximity to Other Operations: Rawhide Mine is adjacent to north

First Coal Shipped: 1978

1979 Production: 3.7 mt

1980 Production: 8.4 mt

Ultimate Mine Design Capacity: 26 mty

Remaining Mine Life: 28 years

Mining Method: Truck/shovel

Recovery Rate: 99%

Permitted Mine Plan Area: 4,304 acres

Federal Lease Area Associated with Mine Plan: 3,520 acres

Pending Actions: Proposed increase in permit area to 4,904.7 acres

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Coal Data

Seam Name(s): Wyodak

Thickness (ft): 112

Rank: Subbituminous

BTU/lb: 8,281

Sulfur (%): 0.44

Overburden Thickness: 172 ft

Overburden/Coal Ratio: 1.32

Reserves:

Total recoverable permitted mine plan (mt): 536

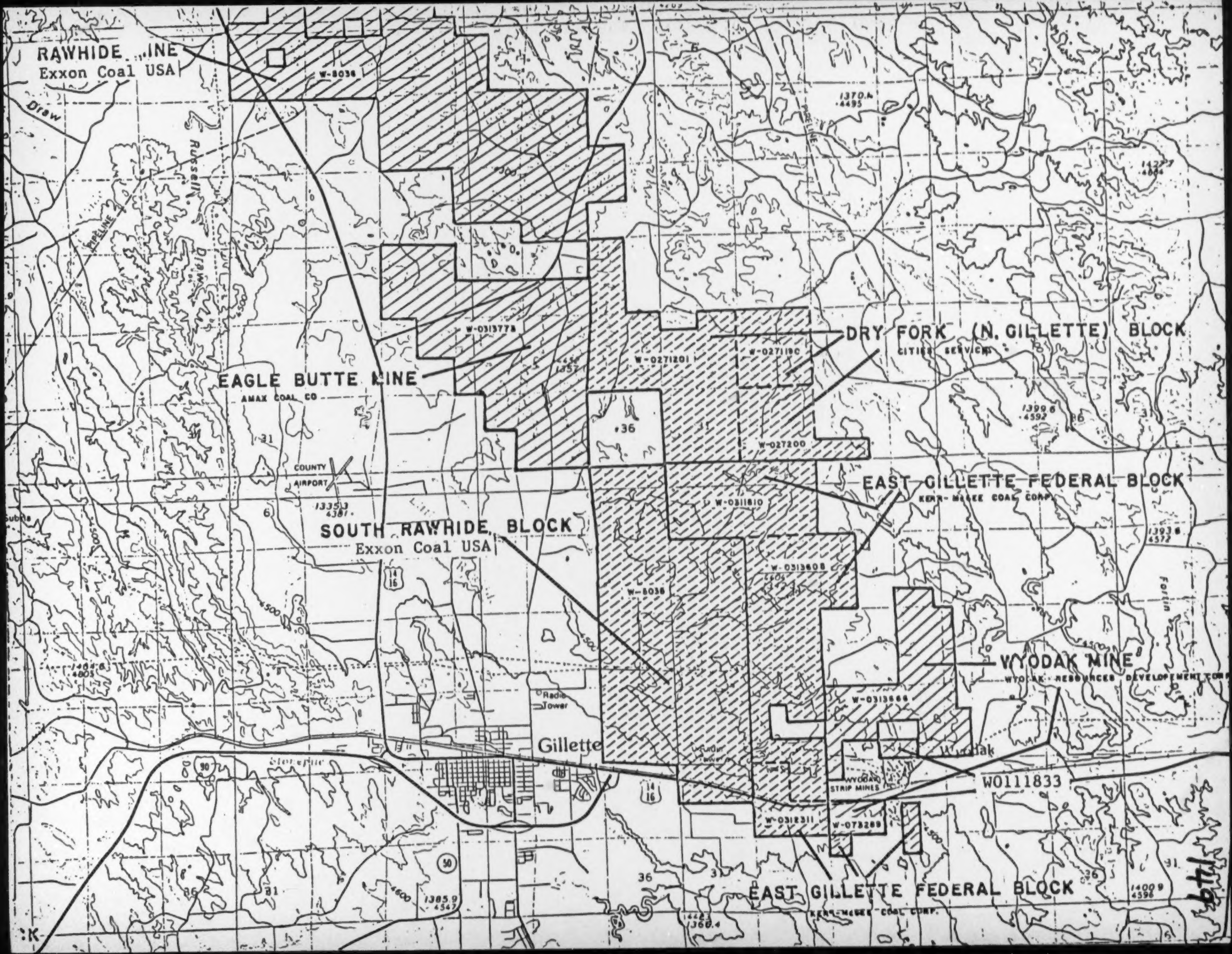
Total recoverable permitted federal in mine plan (mt): 486.4

Total recoverable federal in leaseblock: 486.4

Notes:

Mining of Little Rawhide Creek has been approved; however, AMAX Coal must demonstrate that the area can be reclaimed consistent with the provisions of the Wyoming Program for restoring the essential hydrologic functions of alluvial valley floors.

AMAX Coal has contracted for over 90% of reserves at Eagle Butte and Belle Ayr Mines.


RAWHIDE MINE
Exxon Coal USA
W-8036
Draw
Russell
PIPELINE
Draw
1370.4
4495
PIPELINE
1427.7
4684
W-0313778
1456
1357
EAGLE BUTTE MINE
AMAX COAL CO
W-0271201
W-027119C
DRY FORK (N. GILLETTE) BLOCK
CITIES SERVICE
W-027200
36
1399.6
4592
36
31
31
31
COUNTY
AIRPORT
1335.3
4381
6
EAST GILLETTE FEDERAL BLOCK
KERR-McGEE COAL CORP.
W-0311810
SOUTH RAWHIDE BLOCK
Exxon Coal USA
1393.6
4572
4500
14
16
W-0313608
W-8036
4500
Fortin
WYODAK MINE
WYODAK RESOURCES DEVELOPMENT CORP
1404.6
4605
Radio
Tower
W-0313666
Gillette
Wyodak
90
W0111833
WYODAK
STRIP MINES
14
16
W-0318311
W-073289
4500
90
4600
1385.9
4547
36
31
36
31
36
31
EAST GILLETTE FEDERAL BLOCK
KERR-McGEE COAL CORP.
1400.9
4596
1442.3
1368.4
K

EAGLE BUTTE MINE

The Eagle Butte Mine, located about six miles north of Gillette, Wyoming, is operated by AMAX Coal Company, a division of AMAX, Inc. The open pit, truck/shovel operation began shipping coal in 1978 from a state coal lease north of federal lease W-0313773. Production of federal coal is expected to begin in 1982. AMAX Coal Company has already obtained contracts for about 90% of its reserves at the Eagle Butte and Belle Ayr Mines. Peak production from Eagle Butte for the 1980 to 1990 decade is expected to be 26 mt in 1986. (AMAX Coal, 1981)

AMAX Coal has devoted considerable attention to the alluvial valley floor issue, as well as to broader hydrologic concerns. One AMAX Coal official commented that hydrology represents the most significant environmental issue at Eagle Butte. The State of Wyoming has determined that Little Rawhide Creek, which flows through the extreme northwestern part of lease W-0313773, as well as the Wyoming state lease, meets the criteria of an alluvial valley floor, although the valley is considered insignificant to farming. In order to gain approval to mine Little Rawhide Creek, AMAX Coal must demonstrate that the valley can be successfully reclaimed.

The Dry Fork of the Little Powder River, which flows along the extreme southeastern margin of lease W-0313773, is under study as a possible alluvial valley floor. Initial review by the U. S. Office of Surface Mining (OSM) indicates that mine plan approval should not be affected by the status of Dry Fork.

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Background

Federal coal lease W-0313773 was offered for lease on June 25, 1965 and successfully bid by Ayrshire Collieries Corporation at $26.50 per acre. On October 1, 1969 the lease was assigned to Meadowlark Farms, Inc., a wholly-owned subsidiary of Ayrshire Collieries Corporation. Following the merger of Ayrshire Collieries and American Metals Climax, Inc., a coal mining division was formed, AMAX Coal Company.

AMAX Coal submitted a mining and reclamation plan to the U. S. Geological Survey (USGS) on April 23, 1974. A revised mining plan was submitted to the Wyoming Department of Environmental Quality (WDEQ) in September 1975, and State mining permit 428 was issued to AMAX Coal on May 5, 1976.

In early 1977, a comprehensive mining and reclamation plan was submitted to the USGS, and a final environmental impact statement on the plan was issued August 23, 1977. On April 28, 1977 AMAX Coal received State mining permit 428C-A1, permitting an area bordering the pit to be used to construct overburden benches and diversion ditches. On February 4, 1977 AMAX Coal was granted license 240C-L2, allowing overburden stripping, but not coal removal, on adjacent lands leased by The Carter Mining Company.

Physical Environment

The Eagle Butte Mine lies entirely within the drainage basin of the Little Powder River. Most (75%) of the mine drains into Little Rawhide Creek, while the remainder drains into Dry Fork Little Powder River. Little Rawhide Creek has a drainage area of about 23 square miles above the mine, while Dry Fork has a basin of about 4.3 square miles above the mine.

Coal seams on the mine are continuous throughout the area with the exception of one major erosional area. A complex of faults, folds, burns and splitting of seams is located near this "cut-out." Overburden above the target Anderson-Canyon (Wyodak) seam is either the Eocene Wasatch formation or is Recent alluvium or colluvium. Overburden thickness varies from six to 380 feet. Overburden bedrock strata consist of interfingering mudstones, shales and sandstones, mostly poorly consolidated. Overburden geochemistry indicates that some spoils might be high in arsenic, potentially affecting either ground water or vegetation.[1] Parting material between the two mined coal seams, however, is to be selectively buried.

The target seam is separated by a parting four to six feet in thickness. AMAX Coal refers to the seam above the parting as the C seam and the lower seam as the Wyodak. Together, they average about 112 feet in thickness. The overburden-to-coal ratio for the mine is 1.32:1. (AMAX Coal Company, 1979)

Mining and Reclamation: Methods and Issues

Following topsoil removal, overburden is removed by either Bucyrus-Erie 295B or Marion 204 shovels. In the first years of operation, overburden was removed and stored. At present, adequate pit size has been developed and spoils are hauled to an abandoned portion of the pit. All future spoils will also remain in the pit. Overburden and coal are removed in benches averaging about 40 feet high. In areas of maximum overburden, 13 benches--ten for overburden and three for coal--will be worked simultaneously. Coring and analyzing of overburden at the advancing highwall allows a semi-annual assessment of the needs for selective burial of toxic overburden.

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[1] Two drill logs show high arsenic levels; however, AMAX Coal states this situation is probably a function of testing methods. (AMAX Coal, 1981, Vol. 2, p. 2.5-7)

Given the low overburden-to-coal ratio at the mine, there will be a net lowering of the reclaimed land surface. However, all portions of the final surface will drain. Little Rawhide Creek has already been diverted to accommodate mining of the state coal lease. AMAX Coal's continuing study of mine site hydrology has reflected changing regulatory concerns during the period of implementation of Pl 95-87. Continuing studies and review will alter the reclamation plans originally approved in 1976, but will probably not affect the amount of reserve permitted for recovery.

REFERENCES

AMAX Coal Company. 1980. Updated permit application and mine and reclamation plan, Eagle Butte Mine, April 1: 5 vols.

Ham, Dave. 1980. Personal communication: AMAX Coal Company staff, telephone conversation, October 31.

Mooney, G. 1980. Personal communication: Sheridan, Wyoming DEQ staff, interview.

U. S. Bureau of Land Management. 1979. Final environmental statement on proposed development of coal resources in Eastern Powder River, Wyoming: 2 vols.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
EAGLE BUTTE MINE	AMAX COAL CO. (AMAX, INC.)	W-0313773	3520a (3318.25a AMAX resurvey)	51N72W21, 22, 23, 26, 27, 28, 34, 35	9/1/1965	$1.00/a	20¢/TON	PRODUCING

Original lessee Ayrshire Collieries Corp:
Assigned to Meadowlark Farms 10/1/1969
Assigned to AMAX Coal Co. 3/1/1977

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
			COAL					
EAGLE BUTTE MINE	AMAX COAL CO.	W-0313773	4304. a	3520a	640	TRUCK/ SHOVEL	PRODUCING	26 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE:

RECOVERABLE: 536 MT

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF WYOMING LEASE

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK: EAGLE BUTTE MINE

LESSEE(S): AMAX COAL CO.

NUMBER OF LEASES: 1

DATE MINE OPENED: 1978

PROJECTED CLOSING DATE: 2009

REMAINING MINE LIFE: 28 YRS

REMAINING RECOVERABLE RESERVES:

FEDERAL: 486.4

NON-FEDERAL: 49.6

MINE DESIGN CAPACITY: 26 MTY[1]

RECOVERY RATE: 98%

CUMULATIVE PRODUCTION TO 1979: 241,125 T

1979 ACTUAL PRODUCTION: 3,732,660 T

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	8.4	0	8.4
1981	13.0	0	13.0
1982	17.0	0	17.0
1983	17.0	0	17.0
1984	18.0	8.7	18.0
1985	20.0	20.0	20.0
1986	24.0	24.0	24.0
1987	26.0	26.0	26.0
1988	25.0	25.0	25.0
1989	24.0	24.0	24.0
1990	24.0	24.0	24.0
Post 1990	22.0	22.0	22.0

NOTES:

[1] Additional crusher and expanded maintenance facilities will be added to increase design capacity to 26 MTY by 1986

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
EAGLE BUTTE MINE	AMAX COAL CO.	1	TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM
SEAM NAME	"C" + WYODAK							
FORMATION								
RANK	SUBBITUMINOUS B							
THICKNESS	112'							
BTU/LB	8282							
SULFUR (%)	0.44.%							
ASH (%)	5.15%							
MOISTURE (%)	29. 33%							
FIXED CARBON (%)	33.74%							
VOLATILE (%)	31. 79%							
SEAM DEPTH	172 avg. - 6-380							
IN-PLACE RESERVES	541 mt							
RECOVERABLE RESERVES	536 MT							
RECOVERY RATE	99%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	486.4	—	—	
	SURFACE	406.4	49.6	536[1]	
	UNDERGROUND	0	0	0	

NOTES:

[1] Reserves as of 1/1/81; original reserves were 486.4 (Fed.), 58 (non-Fed.), (Am, 1980)

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE STRIP MINES (UNDIFFERENTIATED)

COMPANY: AMAX COAL COMPANY

COAL RESERVES: 1,016 million short tons

TOTAL CONTRACTED TONNAGE: 895.4 million short tons

MINE CAPACITY: 40 million short tons

CONTRACTED ANNUAL PRODUCTION: 37.1 million short tons

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
							Delivered Price		
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Per Ton	Cents/ MMBTU	Miscellaneous Comments
American Electric Power Co.	Unspecified plant in IN and OH:	25 myn tons[1]	?	?	?				May be in effect now; rail rate to Cook barge terminal at Metropolis, IL $10.32 (1976)
Indiana and Michigan Electric Co.	Breed Plant, Sullivan, IN 400 MW; 1 myn tons/year on line 1976	25 myn tons	1.0 myn tons	25 years	1976-2000		$14.89[2] (1977)	68.3¢	Contract announced in 1974; ? intermittent contract after 1977-tonnage may be going to other AEP plants
Indiana and Michigan Electric Co.	? Rockport No. 1, Rockport, IN 1300 MW; 3 myn tons/year Startup in 1982	75 myn tons[1]	3.0 myn tons	25 years	1982-2007				Probable contract although not totally confirmed
	? Rockport No. 2, Rockport, IN 1300 MW; 3 myn tons/year Startup in 1984	75 myn tons[1]	3.0 myn tons	25 years	1984-2009				Probable contract although not totally confirmed
Interstate Power Co.	Lansing Plant, Lansing, IA 322 MW; 0.8 myn tons/year On line in 1977	8 myn tons[1]	0.4 myn tons	20 years	1977-1996		$19.24[2] (1977)	110.4¢	Contract announced in 1975; blended with MT and IL coal
Iowa Power and Light Co.	Des Moines No. 2, Des Moines, IA 277 MW; 0.572 myn tons/year On line 1975	4.8 myn tons	0.24 myn tons	20 years	1975-1994		$15.14[2] (1977)	92.3¢	Contract announced in 1975

Notes: [1] Estimated [2] FERC data [3] Initial contract price without adjustments

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE STRIP MINES (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
Iowa Power and Light Co.	Council Bluffs No. 3, Council Bluffs, IA 650 MW; 2.3 myn tons/year On line in 1979	46 myn tons	2.3 myn tons	20 years	1978-1997	$3.84[1] (1979)	$11.09[2] (1979)	66.0¢ (1979)	Contract announced in 1975; 1979 rail rate $7.25
Iowa Southern Utilities Co.	Burlington Plant, Burlington, IA 207 MW; 0.517 myn tons/years On line in 1975	0.9 myn tons	0.1 myn tons	9 years	1975-1983		$16.55[2] (1977)	82.1¢	No contract details
Kansas City Power and Light Co.	LaCygne Station, LaCygne, KS 630 MW; 1.8 myn tons/year On line in 1976	36 myn tons	1.8 myn tons	20 years	1976-1995	$1.90[3]	$12.46[2] (1978)	74.1¢	Contract announced in 1974; plant jointly owned by Kansas City Power & Light and Kansas Gas and Electric Co.
Kansas City Power and Light Co.	Iatan No. 1, Weston, MO 630 MW; 1.8 myn tons/year Startup in 1980	5.4 myn tons	1.8 myn tons	3 years[1]	1979-1982				Contract announced in 1979; plant jointly owned by Kansas City Power & Light (535 MW) and St. Joseph Light & Power Co. (95 MW): 1979 rail rate $9.34
Kansas Power And Light Co.	Jeffrey No. 1, St. Marys, KS 680 MW; 2.0 myn tons/year On line in 1978	50 myn tons	2.0 myn tons	20 years	1977-1996		$11.18[2] (1977)	66.5¢	Contract announced in 1975; plant jointly owned by Kansas Power & Light (435 MW), Kansas Gas & Electric Co. (136 MW),

Notes:

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE STRIP MINES (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
									Missouri Public Service Co. (54 MW), and Western Power Division (55 MW); 1977 rail rate $5.98 (695 miles)
	Jeffrey No. 2, St. Marys, KS 680 MW; 2.0 myn tons/year Startup in 1980	50 myn tons	2.0 myn tons	20 years	1979-1999				See notes above
	Jeffrey No. 3, St. Marys, KS 680 MW; 2.0 myn tons/year Startup in 1983	50 myn tons	2.0 myn tons	20 years	1982-2002				See notes above
	Jeffrey No. 4, St. Marys, KS 680 MW; 2.0 myn tons/year Startup in 1985	50 myn tons	2.0 myn tons	20 years	1985-2005				See notes above
Oklahoma Gas and Electric Co.	Muskogee No. 4 and No. 5, Muskogee, OK 1030 MW; 3.0 myn tons/year On line in 1978	?	0.5 myn tons[1]	?	?1978- ?		$21.95[2] (1979)	121.6¢	Contract noted in 1978; no contract details; 1976 rail rate $9.80
Portland General Electric Co.	Carty Plant, Boardman, OR 530 MW; 1.2 myn tons/year Startup in 1980	28.8 myn tons	1.2 myn. tons	24 years	1979-1998	$6.00[3]			Contract announced in 1975; plant jointly owned by Portland General Electric (424 MW), Bonneville Power Administration (53 MW), and

Notes:

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE STRIP MINES (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
									Idaho Power Co. (53 MW)
Public Service of Colorado	Commanche Plant, Pueblo, CO 660 MW; 2.9 myn tons/year On line in 1973	52 myn tons	2.6 myn tons	20 years	1973-1992	$2.50[3]	$10.26[2] (1978)	61.1¢	Contract announced in 1972; 1973 rail rate $4.85
Public Service of Colorado	Pawnee No. 1, Brush County, CO 470 MW; 2.15 myn tons/year Startup in 1980	43 myn tons	2.15 myn tons	20 years	1979-2000				Contract announced in 1975
Public Service of Colorado	?Southeastern No. 1, CO 470 MW; 2.15 myn tons/year Startup in 1984	43 myn tons	2.15 myn tons	20 years	1984-2003				Contract noted in 1975
Southwestern Electric Power Co.	Welsh No. 1, Cason, TX 528 MW; 1.75 myn tons/year On line in 1977	42.5 myn tons	1.75 myn tons	25 years	1976-2000	$5.36[1] (1979)	$17.48[2] (1979)	104.1¢	Contract announced in 1974; 1979 rail rate $12.12
	Welsh No. 2, Cason, TX 528 MW; 1.75 myn tons/year Startup in 1980	42.5 myn tons	1.75 myn tons	25 years	1979-2004				See note above
	Welsh No. 3, Cason, TX 528 MW; 1.75 myn tons/year Startup in 1982	42.5 myn tons	1.75 myn tons	25 years	1981-2006				See note above

Notes:

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE STRIP MINES (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
							Delivered Price		
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Per Ton	Cents/ MMBTU	Miscellaneous Comments
Southwestern Electric Power Co.	Flint Creek No. 1, Siloam Springs, AR 528 MW; 1.75 myn tons/year On line in 1978	42.5 myn tons	1.75 myn tons	25 years	1978-2002	\$7.51[1] (1979)	\$17.75[2] (1979)	105.7¢	Contract announced in 1974; plant jointly owned by Southwestern Electric Power (264 MW) and Arkansas Electric Coop. (264 MW); 1979 rail rate \$10.24
Wisconsin Power and Light Co.	Columbia No. 2, Portage, WI 527 MW; 1.6 myn tons/year On line in 1978	32 myn tons[1]	1.6 myn[1] tons	20 years[1]	1978-1997		\$19.71[2] (1979)	117.4¢	Contract noted in 1979; plant jointly owned by Wisconsin Power and Light (280 MW), Wisconsin Public Service Corp. (130 MW), and Madison Gas and Electric Co. (117 MW).
Dairyland Power Coop.	John P. Madgett Plant, Alma, WI 350 MW; 1.0 myn tons/year Start up in 1979	20 myn tons[1]	1.0 myn tons	20 years[1]	1979-1998				Contract noted in 1979, no other details

Notes:

COAL CONTRACT INFORMATION

MINE NAME: BELLE AYR AND EAGLE BUTTE MINES (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
SPOT SALES									
Appalachian Power Co.	J.E. Amos Plant, St. Albans, WV 2,900 MW; 6.8 myn tons/year On line	0.085 myn tons[1]		Spot	1978-1979	$5.89-$6.00 (1978)	$21.89-$22.00		Sold during strike; blended with WV coal; shipped through Cook barge terminal at Metropolis, IL
Arkansas Power and Light Co.	White Bluff No. 1, Redfield, AR 700 MW; 2.5 myn tons/year On line			Spot	1979				Noted in 1979; supplied by Cordero and Jacobs Ranch mines; 1979 rail rate $14.16
Public Service of Indiana	Wabash River Plant, Terre Haute, IN 889 MW; 1.7 myn tons/year On line			Spot	1978-1979		$29.74[2]	183.6¢	Sold during strike; blended with IN and KY coals
Ohio Electric Co.	General James M. Gavin Plant, Gallipolis, OH 2,600 MW; 8.1 myn tons/year On line			Spot	1978-1979				Sold during strike; blended with OH, PA, and WV coals; shipped through Cook barge terminal at Metropolis, IL
Tennessee Valley Authority	Unspecified plants	0.2 myn tons[1]		Spot	1978-1979				Sold during strike

Notes:

Mine Name: Wyodak Mine

Lease Number(s): W073289
W0111833
W0313666

Location: Campbell County, Wyoming

Lessee: Wyodak Resources Development Corp. (Black Hills Power and Light Co.)

Operator: Wyodak Resources Development Corp.

Proximity to Other Operations: Clovis Point Mine is adjacent to the west

First Coal Shipped: 1922

1979 Production: 2.4 mt

1980 Production: 2.5 mt

Ultimate Mine Design Capacity: 5 mty

Remaining Mine Life: 33 years

Mining Method: Truck/shovel

Recovery Rate: 91%

Permitted Mine Plan Area: 3,273.9 acres

Federal Lease Area Associated with Mine Plan: 1,880 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 70

Rank: Subbituminous

BTU/lb: 8,000

Sulfur (%): 0.5

Overburden Thickness: 30-200 ft

Overburden/Coal Ratio:

Reserves:

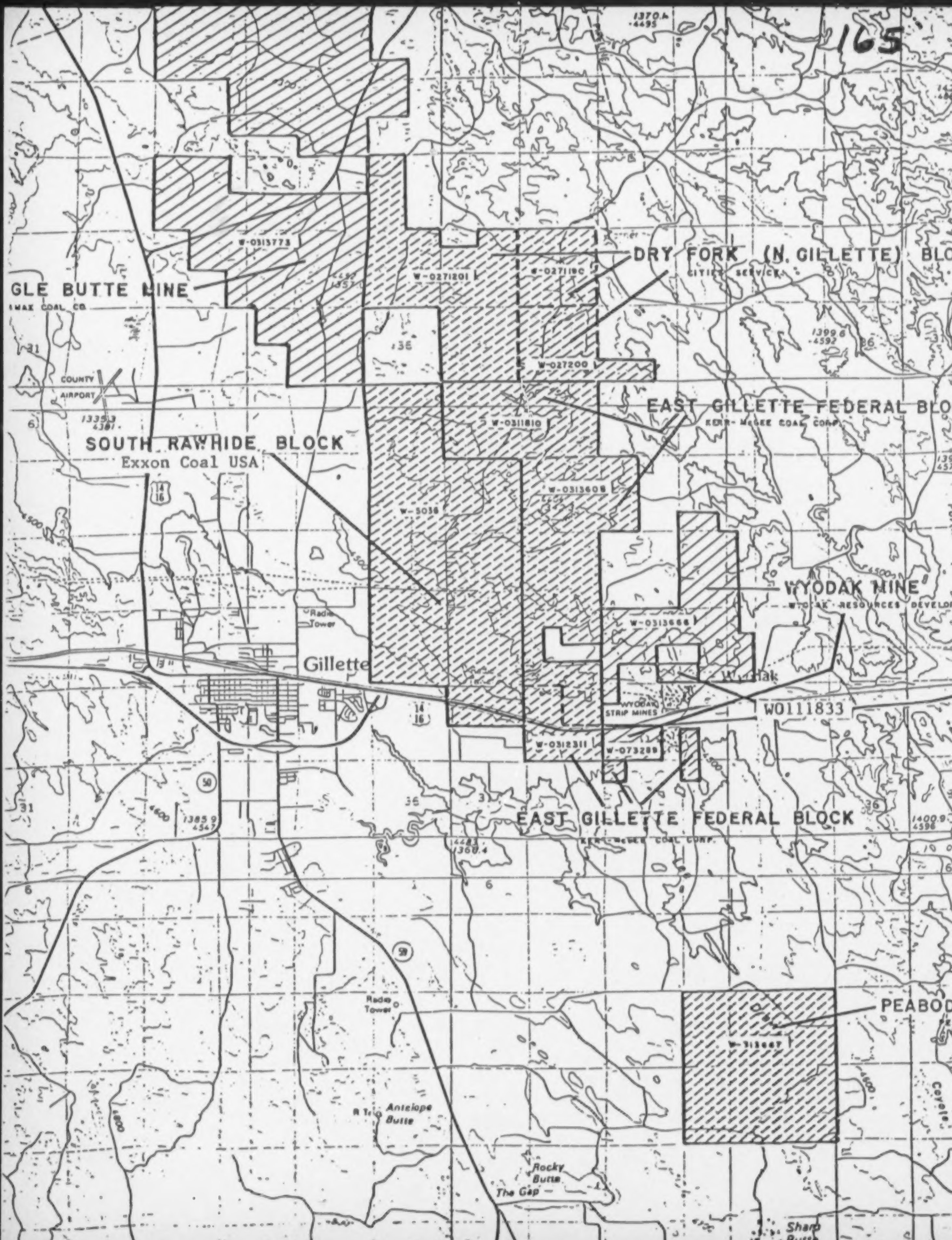
Total recoverable permitted mine plan (mt): 165.3

Total recoverable permitted federal in mine plan (mt): 154.4

Total recoverable federal in leaseblock: C

Notes:

Groundwater flow into the active south pit has been steady. The source of the water may be either Donkey Creek alluvium (pit waters are discharged back into Donkey Creek) or bedrock aquifers. A deficiency exists in available spoils for regrading. Closed depressions are proposed for the reclaimed surface. Comprehensive regulatory response to this proposal is forthcoming.


GLE BUTTE MINE
AMAX COAL CO.
W-0313773
DRY FORK (N. GILLETTE) BLO
CITIES SERVICE
W-0271201
W-027119C
W-027200
EAST GILLETTE FEDERAL BLO
KERR-McGEE COAL CORP.
W-0311810
W-0313608
W-5036
SOUTH RAWHIDE BLOCK
Exxon Coal USA
COUNTY AIRPORT
1335.3
4381
WYODAK MINE
WYODAK RESOURCES DEVELO
W-0313666
Wyodak
WYODAK STRIP MINES
W0111833
W-0312311
W-073289
EAST GILLETTE FEDERAL BLOCK
KERR-McGEE COAL CORP.
Gillette
Radio Tower
PEABOD
W-313667
Antelope Butte
Rocky Butte
The Gap
Sharp Butte
1370.4
4495
1399.6
4592
1385.9
4547
4483
1366.4
1400.9
4596
Coyote

WYODAK MINE

The Wyodak Mine is located about six miles east of Gillette, Wyoming. Interstate 90 and the main line of the Burlington Northern Railroad divide the mine into a North Pit and a South Pit. The mine is operated by Wyodak Resource Development Corporation, a wholly-owned subsidiary of the Black Hills Power and Light Company.

Background

The Wyodak Coal and Manufacturing Co. opened a mine in 1922 on privately owned coal in what is now called the North Pit. By 1925, the mine was producing 300 tons daily. In 1959, the company leased 240 acres of federal coal (W-073289) south of the highway, and moved the mining operation to this South Pit.

The company was awarded an 80-acre federal lease north of the highway in 1961 (W-011833). The North Pit was placed on a standby status in case the South Pit should ever be flooded by adjacent Donkey Creek. In 1965 the company was awarded a federal lease of 2,200 acres (W-0313666) adjacent to the North Pit as a reserve for their mining operation. The acreage on this lease was reduced in 1972 to 1,560 acres.

In summer 1978, Black Hills Power and Light Company and Pacific Power and Light Company opened the 330-megawatt Wyodak power plant adjacent to the Wyodak Mine. The production of the mine is contracted to this power plant and the nearby Neil Simpson power plant, operated solely by Black Hills Power and Light. Tentative plans exist to construct another Wyodak power plant (330 megawatts or 660 megawatt plant by 1989), which would necessitate increasing mine production to 5 mty.

Physical Environment

The Wyodak lease area is within the Powder River basin. There are numerous broad hills and sharp ridges, as well as some flat or gently sloping lands in the area. The major land category of the Wyodak area is rolling uplands, but the most notable feature is Donkey Creek, which bisects the southern portion of the permit area. The quality of water in the creek is poor, possibly due to the City of Gillette's sewage discharge, as well as from previous railroad construction and the resulting channelization of the creek.

Most of the mine area is overlain by the Wasatch formation. This formation consists of argillaceous and arenaceous mudstones interbedded with weakly cemented sandstones. The Fort Union formation is found over a smaller portion of the immediate area and is similar to the Wasatch in composition. The Fort Union formation, which consists of interbedded sand, silt and clay mudstones, sandstones and coal, approaches 2,000 feet in thickness. Like the Wasatch strata, strata of the Fort Union are lensed, lack continuity and the mudstones (some carbonaceous) are widely variable in particle size distribution.

Mining and Reclamation: Methods and Issues

The Wyodak mine plan calls for topsoil to be removed with scrapers and stockpiled or placed directly on the leveled soil material in the reclaimed mined-out areas. Overburden is to be removed in 30-to-40-foot benches by a truck/shovel combination. Coal is loaded by front-end loaders and transported by truck to a new truckhopper and then conveyed to silos. The operator's plans are for a pit truck dump and conveyor to transport coal to processing plant. An electric shovel may be needed to replace front-end loaders.

The Wyodak Mine is drained by Donkey Creek, an intermittent stream lying south of the South pit. The State of Wyoming determined in February 1980 that there were no alluvial valley floors within the permit area. However, downstream of the mine, Donkey Creek is considered an alluvial valley floor. In 1980, flow into the South pit was reported to be 72,000 gpd, whose source is either bedrock aquifers or alluvium. Donkey Creek has been diverted and the channel extends along the south boundary of the property, permitting maximum recovery of coal in the lease.

A deficiency of overburden exists at the Wyodak Mine, and insufficient spoil is available to return the south pit area to a draining condition. The area will be below the potentiometric surface and will be a permanent depression which may fill with water. Donkey Creek will flow near a regraded depression. Wyodak proposes to use clay seals to eliminate any seepage losses from the creek into the depression. (Wyodak, 1981)

As is true for many of the mines in the Powder River basin, the area is habitat for the bald eagle and golden eagle. There is a golden eagle nest on the mine plan area.

REFERENCES

Wyodak Resources Development Corporation. 1981. Mining and reclamation plan.

STATE: WYOMING **REGION:** POWDER RIVER **COUNTY:** CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
WYODAK MINE	WYODAK RESOURCES DEVELOPMENT CO. (BLACK HILLS POWER & LIGHT CO.)	W-0111833	80	50N71W 21, 22	4/1/61	$1.00	20¢/TON	PRODUCING
		W-0313666	1560	50N71W 10, 15, 21, 22, 28	10/1/65			"
		W-073289	240	50N71W 28	5/1/59	$1.00	15¢/TON	"

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
WYODAK	WYODAK RESOURCES DEVELOPMENT CORP.	W-0111833 W-0313666 W-073289	3273.94	COAL 1812.82	365.90	TRUCK/SHOVEL	PRODUCING	5 MTY

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE:

SOURCE:

RECOVERABLE: 163.2 MT

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

HOMESTAKE MINING COMPANY FEE COAL: BLACK HILLS POWER FEE COAL.

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING	REGION: POWDER RIVER	COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	
WYODAK MINE	WYODAK RESOURCES DEVELOPMENT CORP.	3	DATE MINE OPENED: 1922 PROJECTED CLOSING DATE: 2014 REMAINING MINE LIFE: 33 YRS

REMAINING RECOVERABLE RESERVES:

FEDERAL: 154.4

NON-FEDERAL: 10.9

MINE DESIGN CAPACITY: 5 MTY

RECOVERY RATE: 91%

CUMULATIVE PRODUCTION TO 1979:

1979 ACTUAL PRODUCTION: 2,364,000

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	2.6		2.6
1981	3.0		3.0
1982	3.0		3.0
1983	3.0		3.0
1984	3.0		3.0
1985	3.0		3.0
1986	3.0		3.0
1987	3.0		3.0
1988	3.0		3.0
1989	5.0[1]		5.0[1]
1990	5.0		5.0
Post 1990	5.0		5.0

NOTES:

[1] Contingent on Wyodak Power Plant #2 beginning 1989

Data Sources: Glass, 1980

Wyodak Resources, 1981

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING
REGION: POWDER RIVER
COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK): WYODAK MINE

LESSEE(S) (OR OPERATOR): WYODAK RESOURCES DEVELOPMENT CORPORATION

NUMBER OF LEASES IN BLOCK OR PLAN: 3

MINING METHOD: TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM
SEAM NAME	WYODAK							
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS							
THICKNESS	70							
BTU/LB	8000							
SULFUR (%)	0.5							
ASH (%)	6							
MOISTURE (%)	30							
FIXED CARBON (%)	–							
VOLATILE (%)	–							
SEAM DEPTH	30 - 200							
IN-PLACE RESERVES	181-6							
RECOVERABLE RESERVES	165.3							
RECOVERY RATE	91%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND	–	–	–	
RECOVERABLE:	TOTAL	154.4	10.9[1]	165.3[2]	
	SURFACE	154.4	10.9	165.3	
	UNDERGROUND	0	–	–	

NOTES:

[1] Tupper, 1980

[2] Wyodak, 1981

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

COAL CONTRACT INFORMATION

MINE NAME: WYODAK STRIP MINE

COMPANY: WYODAK RESOURCES DEVELOPMENT CORPORATION

COAL RESERVES: 862 ~~44~~ million short tons[1]

TOTAL CONTRACTED TONNAGE: 50 million short tons

MINE CAPACITY: 5 million short tons

CONTRACTED ANNUAL PRODUCTION: 5 million short tons

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
Black Hills Power and Light Co.	Neil Simpson No. 5, Wyodak, WY; 20 MW; 0.2 myn tons/year On line	3.6 myn tons[1]	0.2 myn tons[1]	~~?10 years~~ ALL NEEDS	? - ?1988		~~$4.82~~[2] (1977)	~~36.7¢~~	Contract began sometime ago: Units 1-4 retired by 1978
Black Hills Power and Light Co.	Osage Plant, Osage, WY; 34.5 MW; 0.22 myn tons/year On line	4.4 myn tons[1]	0.22 myn tons[1]	ALL NEEDS ~~?10 years remaining~~	? - ?1988		~~$6.03- $7.01~~[2] (1979)	~~40.9¢- 45.3¢~~	Contract for this plant began sometime ago
	~~Osage Plant expansion, Osage, WY; 10.0 MW; 0.10 myn tons/year Startup date ?~~	~~2.0 myn tons[1]~~	~~0.10 myn tons[1]~~	~~20 years[1]~~	~~?~~				~~Announced in 1979 although construction schedule not clear: evidently a joint venture with Pacific Power and Light Co.~~
Black Hills Power and Light Co.	Ben French Plant, Rapid City, SD; 22 MW; 0.085 myn tons/year On line	1.7 myn tons[1]	0.085 myn tons	ALL NEEDS ~~?10 years remaining~~[1]	? - ?1988		~~$8.61- $9.37~~[2] (1977)	~~53.0¢- 57.0¢~~	Contract for this plant began sometime ago
Black Hills Power and Light Co.	Kirk Plant, Lead, SD; 31.5 MW; 0.12 myn tons/year On line	2.4 myn tons[1]	0.12 myn tons	ALL NEEDS ~~?10 years remaining~~[1]	? - ?1988		~~$8.66~~[2] (1978)	~~59.6¢~~	Contract for this plant began sometime ago
Grand Island Utilities	Platte No. 1, Grand Island, NB; 100 MW; 0.3 myn tons/year Startup in 1981	6.7 myn tons	0.3 myn tons	20 years	1981-2000	~~[illegible]~~[4]			Contract announced in 1978

Notes: [1] Estimated [2] FERC data [3] 1979 price [4] Company information

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COAL CONTRACT INFORMATION

MINE NAME: WYODAK STRIP MINE (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
Pacific Power and Light Co.	Wyodak No. 1, Wyodak, WY; 330 MW; 1.5 myn tons/year On line	~~[illegible]~~ myn tons[1] 50 m Tons/Year	1.5 myn tons	~~[illegible]~~ years[1] 35	1977-~~[illegible]~~1988				Contract announced in 1973 plant jointly owned by Pacific Power & Light Co. (264 MW) and Black Hills Power & Light Co. (66 MW)
PACIFIC ~~Black Hills~~ Power and Light Co.	Wyodak No. 2, Wyodak, WY; 330 MW; 1.5 myn tons/year ?Startup in late 1980's	50 Tons ~~[illegible]~~ myn tons[1] Per year	1.5 myn tons	~~[illegible]~~years[1] 35	1986- 2021			1980	Contract announced about ~~1978~~; Black Hills Power & Light Co. will own ~~[illegible]~~ (66 MW ~~MW~~ with ~~[illegible]~~ PACIFI P&LI ~~[illegible]~~ owning the remaining ~~[illegible]~~ MW 264
Domestic and Municipal	Sundance Courthouse, Sundance, WY; Moorcroft schools, Moorcroft, WY; 500-600 unspecified customers in WY, SD, MT, and MN	0.025 myn tons[1]		spot		~~$[illegible]~~[1] --			Stoker coal sales
HASTINGS. NEB.	HASTINGS UTILITY 0.3 MILLION TONS PER YEAR	2.1 MILLION TONS	0.15 MILLION TONS/yr.		1980- 1991				
SOUTH DAKOTA	SOUTH DAKOTA CEMENT PLANT	3.0 MILLION TONS	.3		1980- 2000				

Notes:

PLANT 0.15 MILLION TONS/YEAR

Mine Name: Caballo Mine

Lease Number(s): W3397 W49644

Location: Campbell County, Wyoming

Lessee: Exxon Coal USA, Inc. (Exxon, Inc.)

Operator: The Carter Mining Company

Proximity to Other Operations: Belle Ayr Mine is adjacent to south

First Coal Shipped: 1979

1979 Production: 1.3 mt

1980 Production: 2.0 mt

Ultimate Mine Design Capacity: 12 mty

Remaining Mine Life: 42+years (Mine life does not include reserves of east portion of W3397)

Mining Method: Truck/shovel, dragline

Recovery Rate: 96%

Permitted Mine Plan Area: 10,040 acres

Federal Lease Area Associated with Mine Plan: 5,331.4 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 67

Rank: Subbituminous

BTU/lb: 8,357

Sulfur (%): 0.34

Overburden Thickness: 140 ft

Overburden/Coal Ratio: 2

Reserves:

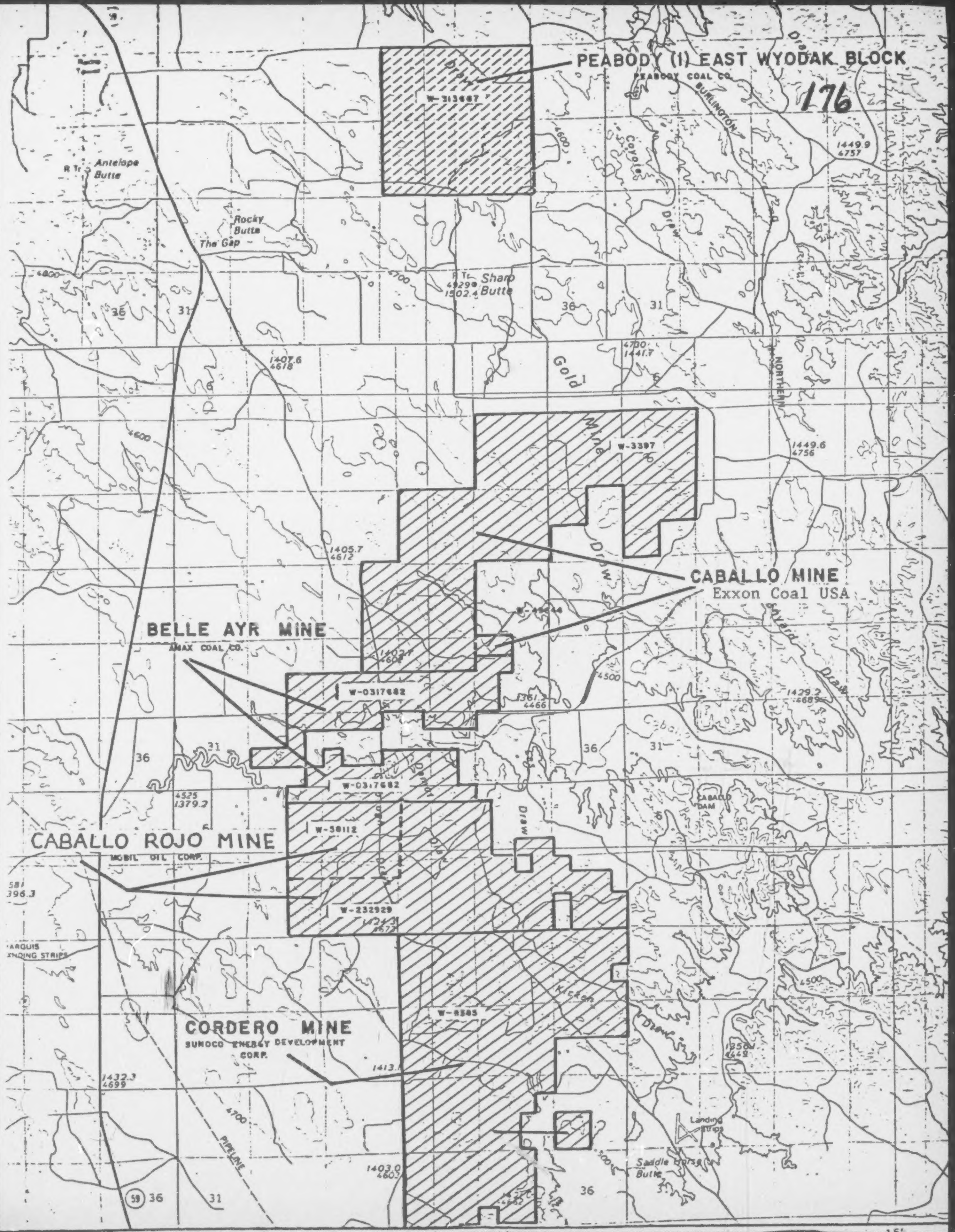
Total recoverable permitted mine plan (mt): 463.8

Total recoverable permitted federal in mine plan (mt): 363.8

Total recoverable federal in leaseblock: 513.8

Notes:

Although having received permit approval for all federal lease acreage, Carter Mining has proposed recovery of only the western portion of W-3397. Substantial reserves of recoverable coal are found in the eastern part of the lease, however. The company has indicated that the eastern reserves may be developed post-1990 for synthetic fuel purposes. The State of Wyoming has required Carter Mining to submit environmental baseline data on all permitted lands and not just those presently approved for mining. A potential alluvial valley floor is found in the eastern lease area.


PEABODY (I) EAST WYODAK BLOCK
PEABODY COAL CO.
W-313667
Antelope Butte
Rocky Butte
The Gap
Sharp Butte
Gold Mine Draw
W-3397
W-49644
CABALLO MINE
Exxon Coal USA
BELLE AYR MINE
AMAX COAL CO.
W-0317682
W-0317682
W-58112
CABALLO ROJO MINE
MOBIL OIL CORP.
W-232929
W-8385
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CORP.
Caballo Draw
Kitchen Draw
PIPELINE
BURLINGTON NORTHERN
Coyote Draw
CABALLO DAM
Landing Butte
Saddle Horse Butte
59
36
31

CABALLO MINE

The Caballo Mine, located about 17 miles southeast of Gillette, Wyoming, is operated by The Carter Mining Company. The Carter Mining Company has been permitted to mine about 464 million tons of coal from federal leases W-3397 and W-49644 and from state and fee reserves. The U. S. Office of Surface Mining approved the expansion of this operation onto federal land in October of 1980. Until that time, Carter Mining Company had solely been mining coal on 3,338 acres of state and fee land. Recovery of reserves on the eastern portion of lease W-3397 is not proposed at this time. The company has indicated that it may propose development of the rest of this lease for synthetic fuel purposes after 1980. (Hamner, 1980)

On June 21, 1976 the State of Wyoming approved a permit for The Carter Mining Company to develop state reserves in 48N71W16. Mining of state, federal, and fee coal was addressed by the U. S. Geological Survey (1979) in a site-specific environmental impact statement (EIS). In addition, the Bureau of Land Management prepared an EIS on Eastern Powder River coal in 1979, which evaluated the cumulative impact of the Caballo Mine with some other mines in this part of the basin. These EISs did not evaluate the compliance of the mine plan with the regulations pursuant to PL 95-87. Therefore, OSM prepared both an environmental assessment and technical analysis which evaluated the applicants' proposed mining methods and reclamation measures, and resulting environmental impacts under the OSM regulations. (U. S. Office of Surface Mining, 1980)

Physical Environment

The topography of the Caballo permit area is characterized by uplands of low, gently rolling hills, with elevation gradually increasing and becoming more rugged to the east. At the eastern permit border, the landscape consists generally of narrow ravines and ridge crests. General elevation of the area is 4,600 feet. The site is drained by three ephemeral streams, Tisdale Creek, North Tisdale Creek, and Gold Mine Draw. These three streams flow off-site into Caballo Creek, which in turn flows into Belle Fourche River. Several playas are found in the western uplands.

The Wasatch and Fort Union formations are exposed in the permit area. The Wyodak-Anderson seam, which is the target of mining, marks the top of the Fort Union formation. The seam averages about 67 feet in thickness. A coal "split line" runs northwest-southeast through the center of the permit area. Coal west of this line is a single seam, with few if any partings. In the eastern area, a shale layer from three to 120 feet thick separates the upper 25-to 50-foot coal seam from the lower 20-to 50-foot coal seam. The coal in this area (eastern part of lease W-3397) is also of lower quality. No significant coal seams of marketable quality have been found up to 180 feet below the Wyodak-Anderson seam. Overburden depths in the area proposed for mining range from less than 25 to 275 feet.

Mining and Reclamation: Methods and Issues

The eastern portion of lease W-3397 is not included in the approved mine plan (The Carter Mining Company, 1981) and no plan has been filed to date. Mining at the Caballo Mine, which began in the southeast corner of the Wyoming State lease, is proceeding to the north and northwest.

Three pits will ultimately be developed. Following topsoil removal, a shovel will strip the overburden in benches, each about 50 feet high. After storing the boxcut spoils, other spoils will be back-filled into the existing pits.

The present mine permit area includes Tisdale and North Tisdale Creeks but not Gold Mine Draw. The U. S. Office of Surface Mining determined in its analysis (OSM, 1980) that Tisdale and North Tisdale Creeks are not alluvial valley floors. This determination was based in part on a lack of evidence of agricultural activities, insignificant areas of flood irrigation, and no evidence of subirrigation along these creeks. Gold Mine Draw has been identified as a potential alluvial valley floor by The Carter Mining Company and the company is continuing studies on the geomorphic and hydrologic characteristics of the draw in conjunction with developing plans for future mining of the eastern area.

Regulatory analysis of hydrologic effects of mining found that: "Mining has lowered and will continue to lower the potentiometric surface of ground water in the vicinity of the mine. This drawdown is projected to extend three to four miles from the farthest northern and southern portions of the operation and two to three miles in the western section." Possible effects on spoil handling at the adjacent Belle Ayr Mine were postulated.

Other impacts from operation of the Caballo Mine include a loss of wildlife habitat. Bald eagles have been observed on the site and golden eagles nest in areas adjacent to mining activities within the permit area.

REFERENCES

The Carter Mining Company. 1981. Mining permit application.

U. S. Geological Survey. 1979. Final environmental-statement, proposed mining and reclamation plan, Caballo Mine.

U. S. Office of Surface Mining. 1980. Technical and environmental analysis.

STATE: WYOMING **REGION:** POWDER RIVER **COUNTY:** CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
CABALLO MINE	EXXON COAL USA, INC.	W-3397	5251.4a	48N70W7, 18 48N71W11, 12, 13, 14, 15, 21, 22, 27, 28	12/1/1967	$1.00/a	20¢/TON	PRODUCING
		W-49644	80a	48N71W26	9/1/65			
			5331.4					

W-3397
Original lessee Humbel Oil & Refining Co.
Assigned to the Carter Oil Co. 7/1/1969
Assigned to Exxon Coal USA 1/1/1980

W-49644
Created out of W-0317682
Original lessee Ayshire Collieries Corp.
Assigned to Meadowlark Farms 10/1/1969
Segregated to The Carter Oil Co. 3/1/1975
Assigned to Exxon Coal USA, Inc. 1/1/1980

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
				COAL				
CABALLO MINE	EXXON COAL USA, INC.	W-3397 W-49644	10,040a	3280a	1020a	TRUCK/SHOVEL, DRAGLINE	PRODUCING	12MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 483.1

RECOVERABLE: 463.8

SOURCE: (CARTER, 1978)

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF WYOMING LEASE 0-26937-A, 640
PROPOSED MINING IN PEABODY PRLA W-32063, 320a
FEE LEASE

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	DATE MINE OPENED: 1979
CABALLO MINE	EXXON COAL USA, INC.	2	PROJECTED CLOSING DATE: 2023
			REMAINING MINE LIFE: 42 YRS+

REMAINING RECOVERABLE RESERVES:

FEDERAL: 363.8

NON-FEDERAL: 100

MINE DESIGN CAPACITY 12 MTY

RECOVERY RATE: 96%

CUMULATIVE PRODUCTION TO 1979: 0

1979 ACTUAL PRODUCTION: 1,272,969

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	2.0	0	
1981	5.0	0	
1982	5.0	5.0	
1983	5.0	5.0	
1984	5.0	5.0	
1985	7.0	7.0	
1986	7.0	7.0	
1987	10.0	10.0	
1988	12.0	12.0	
1989	12.0	12.0	
1990	12.0	12.0	
Post 1990	12.0	12.0	

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
CABALLO MINE	EXXON COAL USA, INC.	2	TRUCK/SHOVEL, DRAGLINE

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM
SEAM NAME	WYODAK							
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS C							
THICKNESS	67							
BTU/LB	8357							
SULFUR (%)	0.34							
ASH (%)	5.27							
MOISTURE (%)	30.1							
FIXED CARBON (%)	33.0							
VOLATILE (%)	31.63							
SEAM DEPTH	125 - 275	(140 avg.)						
IN-PLACE RESERVES	379							
RECOVERABLE RESERVES	63.8							
RECOVERY RATE	96%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND	—	—	—	
RECOVERABLE:	TOTAL	363.8	100	463.8	
	SURFACE	363.8	100	463.8	
	UNDERGROUND	—	—	—	

NOTES:

Eastern portion of W-3397 not proposed for mining, including approximately 150 mT of recoverable reserves.

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

COAL CONTRACT INFORMATION

MINE NAME: CABALLO ~~STRIP~~ surface MINE

COMPANY: CARTER MINING COMPANY

COAL RESERVES: 460 million short tons

TOTAL CONTRACTED TONNAGE: 85.2 million short tons

MINE CAPACITY: 12 million short tons

CONTRACTED ANNUAL PRODUCTION: 3.9 million short tons

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
Missouri Basin Power Project	Laramie River No. 3, Wheatland, WY 500 MW; 2.0 myn tons/year Startup in 1982	53.6 myn tons	2.1 myn tons[1]	25 years	1982-2006				Contract announced in 1978; negotiated through Western Fuels Assoc., Inc.; plant jointly owned by Basin Electric Power Cooperative (210 MW), Tri-State Generation and Transmission Assoc. (120 MW), Missouri Basin Municipal Power Agency (85 MW), Lincoln Electric System (65 MW), Heartland Consumers Power Agency (15 MW) and Wyoming Municipal Power Agencies (5 MW)
Omaha Public Power District	Nebraska City No. 1, Nebraska City, NB 575 MW; 1.8 myn tons/year Startup in 1979	31.6 myn tons	1.8 myn tons	20 years	1979-1998	$5.26[2]	$12.64[2]	74.3¢[1]	Contract announced in 1975; estimated 1979 rail rate $7.38
Grand River Dam Authority	GRDA Pryor, OKLA 490 MW; 2 myn tons/yr. Startup 1981	42 m	2 m	19 yrs	1981-2000	6.05[2]			

Notes: [1] Estimated [2] Initial contract price without adjustments

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1.

Mine Name: Belle Ayr Mine

Lease Number(s): W0317682
W72282

Location: Campbell County, Wyoming

Lessee: AMAX Coal Company (AMAX, Inc.)

Operator: AMAX Coal Company

Proximity to Other Operations: Caballo Mine is adjacent to north, Caballo Rojo Mine is adjacent to south

First Coal Shipped: 1973

1979 Production: 15.0 mt

1980 Production: 15.7 mt

Ultimate Mine Design Capacity: 21 mty

Remaining Mine Life: 20 years

Mining Method: Truck/shovel

Recovery Rate: 98%

Permitted Mine Plan Area: 6,917.5 acres

Federal Lease Area Associated with Mine Plan: 2401 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 72.5

Rank: Subbituminous

BTU/lb: 8,485

Sulfur (%): 0.36

Overburden Thickness: 0-260 ft

Overburden/Coal Ratio: 1.5

Reserves:

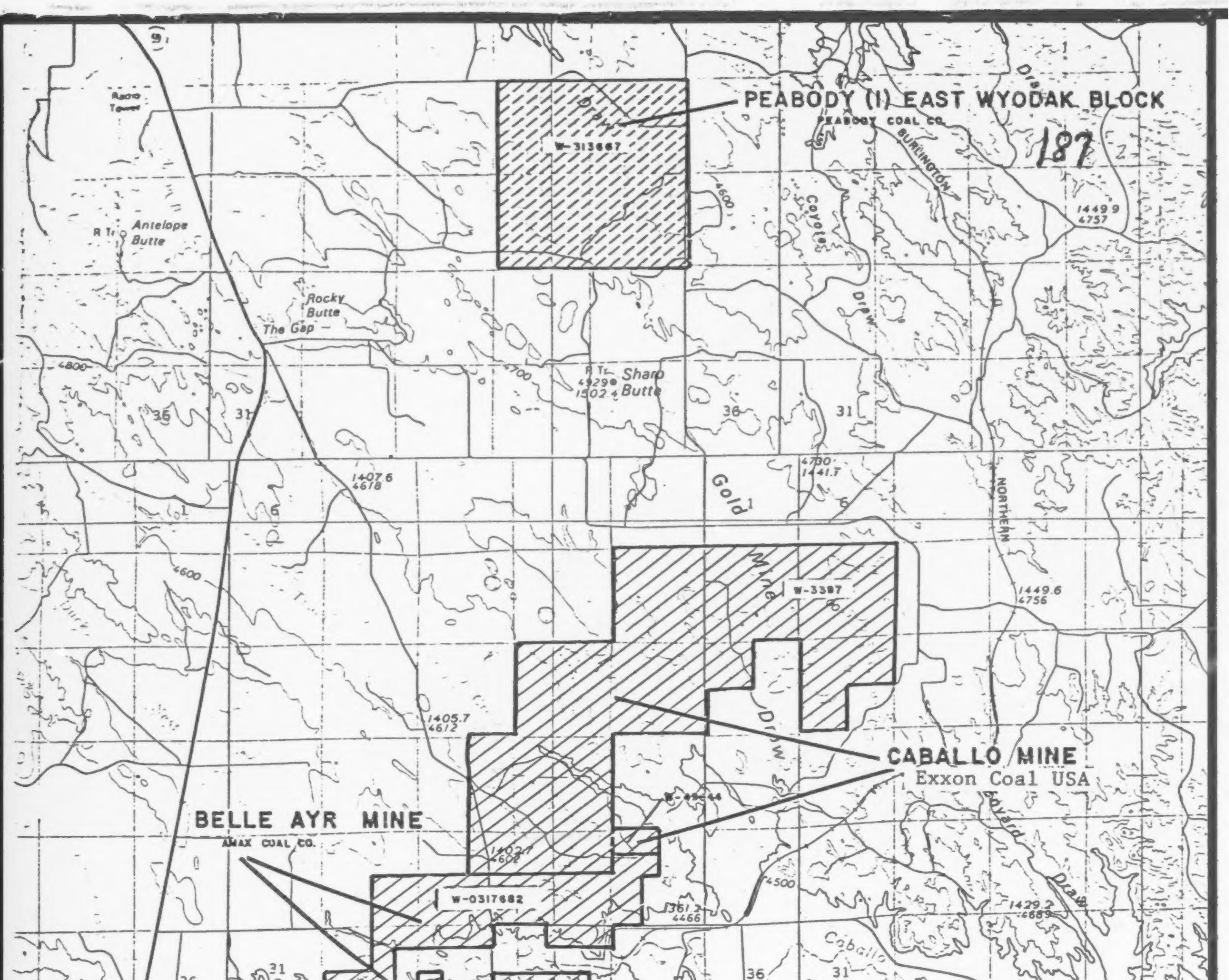
Total recoverable permitted mine plan (mt): 276.1

Total recoverable permitted federal in mine plan (mt): NA

Total recoverable federal in leaseblock: NA

Notes:

The Belle Ayr Mine area includes the Caballo Creek valley, an alluvial valley floor. Mining was approved prior to the passage of PL 95-87, but reclamation of the valley system is still at issue. INFORM (1980) lauds Belle Ayr's reclamation program as incorporating "some of the best procedures known for economical and successful reclamation." For this INFORM mainly credits the truck/shovel mining methods and good water control. Since 1977 more coal has been produced from Belle Ayr than from any other coal mine, either surface or underground, in the entire U. S. AMAX Coal Company markets Belle Ayr and Eagle Butte production together.


PEABODY (I) EAST WYODAK BLOCK
PEABODY COAL CO.
W-313667
CABALLO MINE
Exxon Coal USA
W-3397
W-49644
BELLE AYR MINE
AMAX COAL CO.
W-0317682
W-0317682
CABALLO ROJO MINE
MOBIL OIL CORP.
W-38112
W-232929
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CORP.
W-8385
Radio Tower
Antelope Butte
Rocky Butte
The Gap
Sharp Butte
Gold Mine Draw
Coyote Draw
BURLINGTON
NORTHERN
Caballo
CABALLO DAM
Kicken Draw
Landing Strips
Saddle Horse Butte
MARQUIS LANDING STRIPS
PIPELINE
59
36
31
1
6
4800
4700
4600
4500
1449.9 4757
1449.6 4756
1407.6 4618
1405.7 4612
1402.7 4602
1361.2 4466
1429.2 4689
4525 1379.2
1424.3 4677
1432.3 4699
1413.1
1356 4449
1403.0 4603
4929 1502.4
4700 1441.7

BELLE AYR MINE

The Belle Ayr Mine is located about 14 miles south of Gillette, Wyoming and is operated by the AMAX Coal Company, a subsidiary of AMAX, Inc. The mine is an open pit, truck/shovel operation, typical of Campbell County. Production in 1980 of 15.7 million tons ranked Belle Ayr as the largest coal mine in Wyoming. Production began in 1973, and the mine has developed coal from fee reserves as well as federal coal in lease W-0317682. Caballo Creek bisects the mine site, and the stream will be relocated to accommodate mining. This stream valley, as well as Tisdale Creek, meets the criteria of an alluvial valley floor, but mining in the valleys is permitted under "grandfather" provisions of PL 95-87. Detailed studies and reclamation plans were submitted in December 1980 to document how Caballo Creek will be mined and reclaimed, while still preserving the "essential hydrologic functions" of the valley and the "hydrologic balance" of the entire area. Although these environmental and reclamation studies have yet to undergo detailed regulatory review, it is not expected that production levels will have to be changed to meet reclamation objectives.

Plant facilities at Belle Ayr are sufficient to produce 21 mty; however, presently projected production will not exceed 16 mty and will decrease after 1983. Reportedly, AMAX Coal hopes to gain additional federal coal west of the mine in the 1982 lease sale, and if buyers are found, will increase production. (Glass, 1981)

Background

In 1965, Ayrshire Collieries Corporation won a competitive lease sale for lease W-0317682. AMAX Coal obtained a state permit to mine 80 acres of coal and clinker on February 28, 1972 and gained federal approval in October 1972. An amendment for an additional 18.49 acres was approved in 1973. After passage of the Wyoming Environmental Quality Act, AMAX submitted a permit application for 5,960 acres, which was approved November 26, 1974.

Although the U. S. Geological Survey area mining supervisor had concluded in 1972 that an environmental impact statement on the mining of the federal lease was not necessary, the decision was reversed in 1974. A final EIS was released on October 7, 1975. In 1976, following various legal actions involving a Sierra Club lawsuit, the revised mine plan gained federal approval. On January 24, 1977 a permit amendment was granted, permitting AMAX to disturb surface owned by Carter Oil Company in order to allow maximum recovery of the W-0317682 reserves.

Physical Environment

Land within the Belle Ayr Mine is primarily rolling grassland. Caballo Creek flows from west to east through the area. South of the creek, relief increases and deeper washes and steeper slopes are encountered. A series of low, abrupt clinker-capped hills are found near the eastern permit boundary. Elevations in the permit area vary between 4,450 and 4,600 feet, but local relief does not exceed 60 feet.

Caballo Creek is an intermittent stream with a broad valley .25 to .5 miles wide. Drainage area above the upstream permit boundary is 184 square miles. Ephemeral tributaries, such as Tisdale Creek, to Caballo

Creek have basins ranging in size from one to three square miles.

On the site, overburden above the Wyodak seam consists mostly of the Eosene Wasatch formation and ranges from 0 feet in the bed of Caballo Creek to 260 feet at the northwest corner of the permit area. Alluvium in Caballo Creek valley averages 27 feet in thickness. The Wyodak coal averages 72.5 feet thick with no significant partings. The ratio of overburden to coal is about 1.5:1.

Mining and Reclamation: Methods and Issues

Following topsoil salvage, overburden is removed using five Bucyrus Erie 295B shovels. No additional shovels will be needed to achieve peak production; however, trucks and/or possibly a belt and conveyor system will be added if peak production should exceed 16 mty. Spoil is directly hauled to mined-out areas for back-filling. Overburden and coal are removed in 40-foot benches. In maximum overburden areas, eight benches--six for overburden and two for coal--may be developed. Overburden is sampled periodically ahead of the advancing highwall.

AMAX Coal Company (1979) has summarized the planned progression of mining as follows:

> To generalize, the area to be mined is in the shape of a rectangle with Caballo Creek running west to east through the center. The north half of the rectangle will be mined and a new channel of the creek reconstructed through the reclaimed spoil. While mining the north half, oxbows in the creek will be diverted to allow the pit to maintain the best operational and economical length. After reaching the western boundary, the pit will swing and head in an easterly direction. The new channel will be connected with the existing channel west of the projected mining area, and the old channel will be mined through when the south portion of the rectangle is mined. (p. 289)

The mining of Caballo Creek was first approved in 1972 and was reapproved in 1974 under the revised Wyoming program. Various portions of the diversion channel have been subsequently proposed and approved. The water inflow rate to the pit in 1979 was 150 gpm (gallons/minute). Diversions around the area of mining keep runoff from entering the pit. There has been increased sediment in mining area runoff. A study is presently being conducted to determine when sedimentation ponds may be removed and lands considered reclaimed. (1980) Overburden thicknesses are such that pre-mining relief will not be re-established. AMAX proposes to leave a large permanent depression in the landscape.

INFORM (1980) lauds Belle Ayr's reclamation program as incorporating "some of the best procedures known for economical and successful reclamation." INFORM mainly credits the flexibility of the truck/shovel mining methods, characteristic of all Campbell County mines, and water control measures. No draglines are used at Belle Ayr, making grading, contouring, and selective removal and replacement of soils much easier.

REFERENCES

AMAX Coal Company. 1979. Updated permit application and mine and reclamation plan, Belle Ayr Mine: 5 vols.

Glass, Garry B. 1981. Personal communication, December 31.

INFORM. 1980. Reclaiming the West; the coal industry and surface mined lands: New York.

STATE: WYOMING **REGION:** POWDER RIVER **COUNTY:** CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
BELLE AYR MINE	AMAX COAL CO. (AMAX, INC)	W-0317682	2360.31a 40a. (MINING AGREEMENT WITH USGS)	47N71W 3-5 48N71W 26-29 32-34	9/1/65	$1.00/a	20¢/TON	PRODUCING
	Original Lessee Ayrshire Collieries Corp Assigned to Meadowlark Farms, 10/1/69 80 acres segregated from lease to form W-49644 3/1/75 Assigned to AMAX Coal Co.		AMAX SURVEY INDICATES 2440 ACRES 3/1/77					
		W-72282	41 a.		9/1/80			

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
Belle Ayr Mine	AMAX Coal	W0317682 W72282	6917			truck/shovel	producing	21 mt/y

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE: 281.7

RECOVERABLE: 2761

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING　REGION: POWDER RIVER　COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	
BELLE AYR MINE	AMAX COAL COMPANY	2	DATE MINE OPENED: 1973 PROJECTED CLOSING DATE: 2000 REMAINING MINE LIFE: 20

REMAINING RECOVERABLE RESERVES:
FEDERAL: ~~[illegible]~~ ~220
NON-FEDERAL: ~~[illegible]~~ ~ 50

MINE DESIGN CAPACITY 21.0 MTY
RECOVERY RATE: 98.2%

CUMULATIVE PRODUCTION TO 1979: 260 MT
1979 ACTUAL PRODUCTION: 14,996,875 tons

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	16.1	12.9	16.1
1981	16.0	13.5	16.0
1982	16.0	12.7	16.0
1983	16.0	13.0	16.0
1984	15.0	12.0	1[illegible].0
1985	14.0	11.8	14.0
1986	11.0	9.1	11.0
1987	11.0	10.5	11.0
1988	12.0	12.0	12.0
1989	13.0	13.0	13.0
1990	13.0	13.0	13.0
Post 1990 - 1995	13.0	13.0	13.0
NOTES: 1996 - 1997	11.0	11.0	11.0
1998 - 2000	12.0	12.0	12.0
2001	11.0	11.0	11.0

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK): BELLE AYR MINE

LESSEE(S) (OR OPERATOR): AMAX COAL CO.

NUMBER OF LEASES IN BLOCK OR PLAN: 2

MINING METHOD: TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	WYODAK-ANDERSON							
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS B							
THICKNESS	72.5							
BTU/LB	8485							
SULFUR (%)	0,36							
ASH (%)	5.33							
MOISTURE (%)	28,54							
FIXED CARBON (%)	33.85							
VOLATILE (%)	32,32							
SEAM DEPTH	0-260							
IN-PLACE RESERVES	281.7							
RECOVERABLE RESERVES	276.1							
RECOVERY RATE	98 %							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	~ 220	~ 50	276.1	
	SURFACE	~ 220	~ 50	276.1	
	UNDERGROUND	0	0	0	

NOTES:

195

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Caballo Rojo Mine

Lease Number(s): W23929
W58112

Location: Campbell County, Wyoming

Lessee: Mobil Oil Company

Operator: Mobil Oil Company

Proximity to Other Operations: Belle Ayr Mine adjacent to north; Cordero Mine adjacent to south

First Coal Shipped: 1983

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 15 mty

Remaining Mine Life: 24+years (Mine life does not include reserves of W23929)

Mining Method: Truck/shovel

Recovery Rate: 95%

Permitted Mine Plan Area: 5,815.2 acres

Federal Lease Area Associated with Mine Plan: 4,000 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 65

Rank: Subbituminous

BTU/lb: 7,675-8,893

Sulfur (%): 0.2-0.8

Overburden Thickness: 150 ft

Overburden/Coal Ratio: 2.6

Reserves:

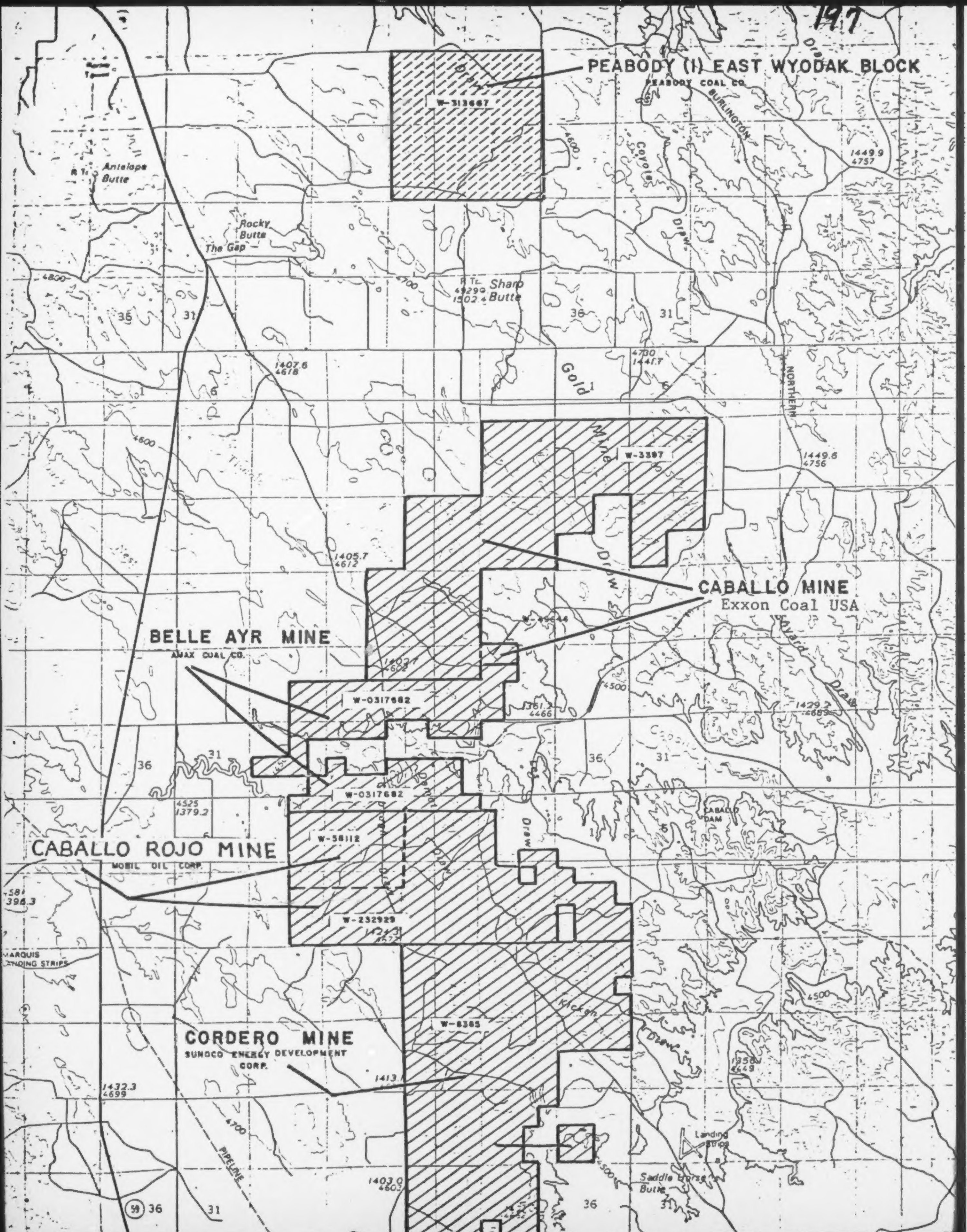
Total recoverable permitted mine plan (mt): 321.4

Total recoverable permitted federal in mine plan (mt): 321.4

Total recoverable federal in leaseblock: 421.4

Notes:

Lease W58112 is expected to be combined with W23923 as one logical mining unit. Mobil Oil Company is presently negotiating for the legal right to mine 120 acres of fee coal within lease W23929. No significant environmental impacts are expected from the mine.


PEABODY (I) EAST WYODAK BLOCK
PEABODY COAL CO.
W-313667
BURLINGTON
NORTHERN
Coyote Draw
Antelope Butte
Rocky Butte
The Gap
Sharp Butte
Gold Mine Draw
W-3397
CABALLO MINE
Exxon Coal USA
W-49644
BELLE AYR MINE
AMAX COAL CO.
W-0317682
W-0317682
CABALLO ROJO MINE
MOBIL OIL CORP.
W-38112
W-232929
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CORP.
W-8385
Kicken Draw
CABALLO DAM
MARQUIS LANDING STRIPS
Landing Strips
Saddle Horse Butte
PIPELINE
1449.9
4757
1449.6
4756
1407.6
4678
1405.7
4612
4700
1441.7
1429.2
4689
1361.2
4466
4525
1379.2
1432.3
4699
1403.0
4603
1413.1
1356
4449
4800
4700
4600
4500
59
36
31
1
6

CABALLO ROJO MINE

The Caballo Rojo Mine is a newly permitted operation in Campbell County, about 17 miles southeast of Gillette, Wyoming. Mobil Oil Company's permit area is 5,815 acres, of which 3,811 acres will be physically disturbed. At present, Mobil Oil proposes only to mine the 2,876 acres of recoverable coal in federal lease W-23929. Two parcels of fee coal totaling 120 acres lie within the exterior boundaries of lease W-23929. Mobil Oil is negotiating with the owners to obtain the legal right to mine this private coal. The Caballo Rojo Mine will be adjacent to the active Belle Ayr and Cordero Mines.

A final environmental impact statement on the mine was released in January 1981 and the mine was approved in February 1981. The final environmental impact statement showed that no site-specific significant mining, reclamation, or environmental impacts are to occur from the operation. However, the cumulative socioeconomic impacts of the Caballo Rojo operation, in conjunction with the several other Campbell County mines, "will be moderately significant." Other projected cumulative impacts include land taken out of agricultural use, reduced wildlife habitat, and railroad traffic impacts. (U. S. Office of Surface Mining, 1981)

Discussions with Mobil Oil officials (W. Boettger, 1980) indicate that the Pronghorn property, federal lease W-58112, which adjoins Caballo Rojo to the northwest, will be proposed for mining in conjunction with Caballo Rojo. Lease W-58112 was held jointly by Mobil Oil and Consolidation Coal Company; however, application was made to transfer control of the lease back to Mobil Oil, the original sole controller. A final environmental impact statement has already been completed on Pronghorn by the U. S. Geological Survey (1979). However, the information included in this EIS is somewhat dated, as the mining and reclamation plan was submitted prior to the regulations pursuant to PL 95-87. Mobil is proposing to combine leases W-58112 and W-23929 into one logical mining unit, and mine the W-58112 reserves sometime after 1987. No formal request for inclusion of W-58112 within the Caballo Rojo permit area has been made to date; however, such an action is expected in the next several years. (W. Boettger, 1980) Reviews to date have not indicated any significant environmental or reclamation issues associated with mining the Pronghorn property. (J. Riddle, 1980)

Physical Environment

The Caballo Rojo permit area is located in the eastern Powder River basin. Elevations on the site range from 4,450 to 4,700 feet, and the topography is characteristically subdued with scattered bluffs (Fig. 1). The site generally drains toward Caballo Creek in narrow ephemeral channels. A small portion of the area drains toward the Belle Fourche River.

As with other sites in Campbell County, the permit area is underlain by the Wasatch and Fort Union formations. Typically, the Wasatch consists of poorly consolidated sandstones, siltstone, shales, and clays, which overlie the Wyodak-Anderson coal seam, the uppermost part of the Fort Union formation (Fig. 2). At the eastern edge of the permit area, the Wyodak-Anderson seam, averaging about 65 feet in thickness, is near the surface. However, the seam is more than 300 feet below the surface at the western permit boundary.

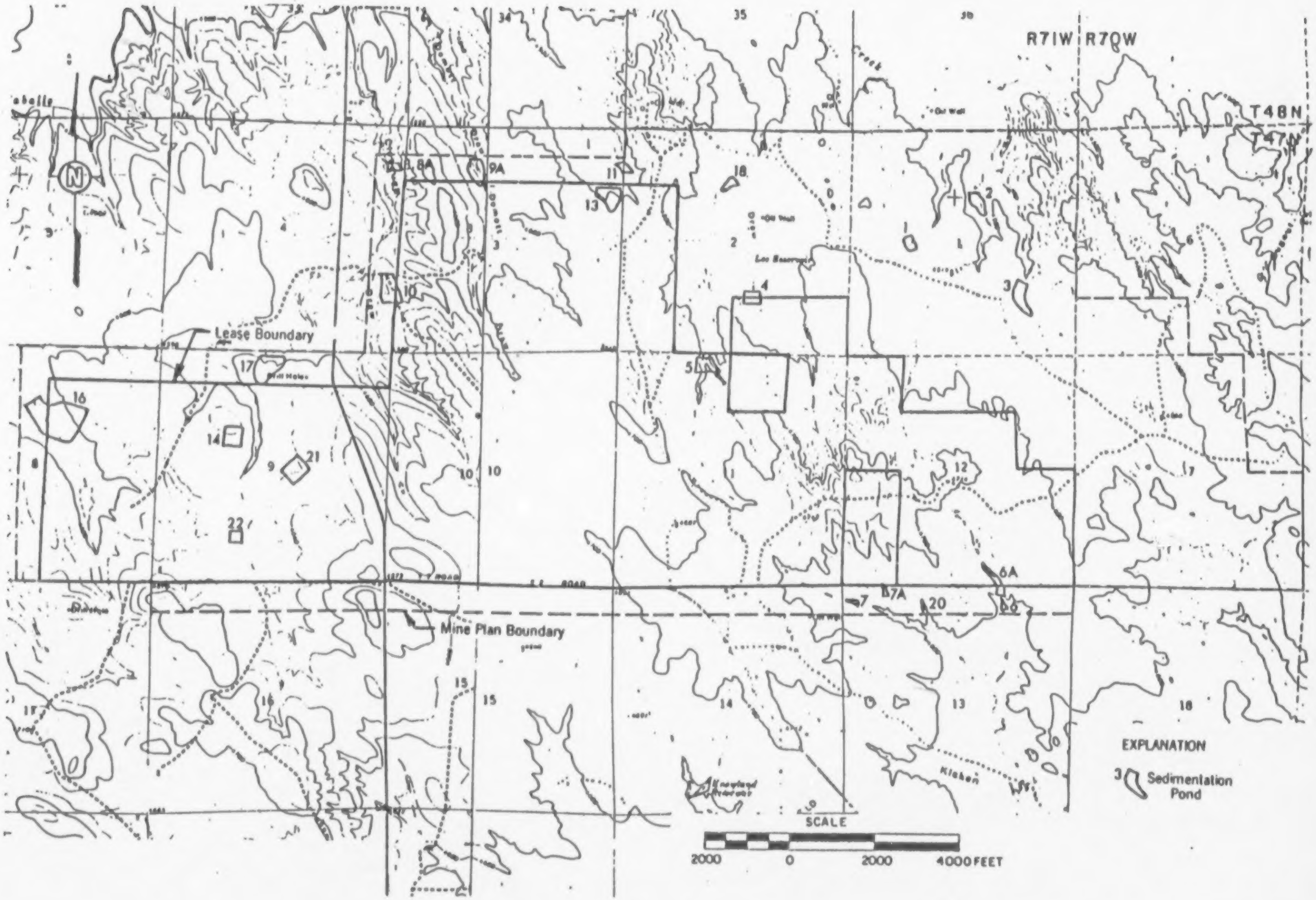

R71W
R70W
T48N
T47N
Lease Boundary
Mine Plan Boundary
Old Well
Los Reservoir
Drill Holes
Caballo
Creek
Kitchen
1
2
3
4
5
6
6A
7
7A
8
8A
9
9A
10
11
12
13
14
15
16
17
18
20
21
22
34
35
EXPLANATION
3 Sedimentation Pond
SCALE
2000
0
2000
4000 FEET

Figure 1 - Topography of Rojo Caballo mine site
(U. S. OSM, 1980, fig. A-4)

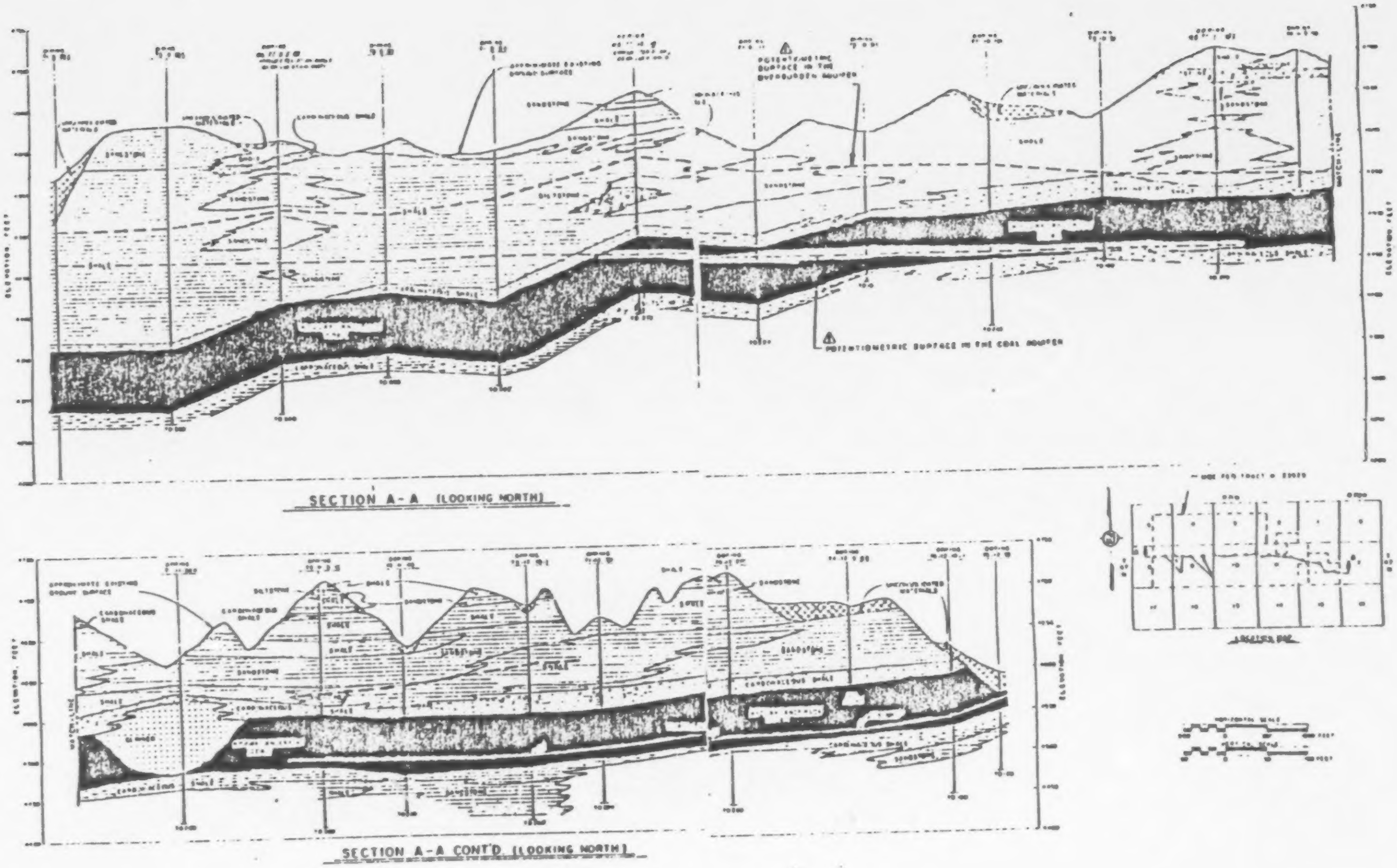

SECTION A-A (LOOKING NORTH)
POTENTIOMETRIC SURFACE IN THE COAL AQUIFER
SECTION A-A CONT'D (LOOKING NORTH)
ELEVATION, FEET

Figure 2- Geologic section through Rojo Caballo minesite
(U. S. OSM, 1980, fog. III-1)

Two types of deleterious overburden occur in the Wasatch formation: (1) fine-grained sediments with equivalent soil textures to silty clay or clay. These can restrict root development and impede rainfall infiltration; and (2) strata whose geochemistry can be "deleterious or potentially deleterious" upon weathering. The final environmental impact statement found that much of the overburden material probably is marginal to questionable for use as subsoil, falling on the boundary between silt and clay-sized particles, and it would be difficult to segregate and special handle overburden with unfavorable textural characteristics. Chemically deleterious sediments consist of materials with either high salinity or with potential or actual acidity. Generally, suitable soil is available to provide two and five feet of topsoil cover for use in reclamation. (U. S. Office of Surface Mining, 1981)

Ground water in the mine plan area vicinity is found in the alluvium of the Belle Fourche River, Caballo Creek, some in ephemeral draws, in the sandstones of the Wasatch formation overburden, in the Wyodak-Anderson coal seam, in the Fort Union formation sandstones below the Wyodak-Anderson, and in deeper aquifers of the lower Fort Union and Lance formations. Only the deeper aquifers are capable of yielding more than a few gallons per minute to properly constructed wells. Quality of ground waters in the Wasatch formation sandstones and in the Wyodak-Anderson coal seam is variable. Total dissolved solids range from 683 milligrams per liter (mg/l) to 2,690 mg/l in the overburden, and from 622 mg/l to 1,090 mg/l in the coal. (U. S. Office of Surface Mining, 1981)

Mining and Reclamation: Methods and Issues

As with most other Campbell County operations, a truck/shovel mining method will be used. Following topsoil removal, overburden will be excavated. Mobil estimates that only about 75 percent of the overburden will require drilling and blasting. Overburden will be loaded into 170-ton trucks using 33-cubic yard mining shovels and either taken to spoil storage areas or back-filled into mined-out portions of the pit.

Mobil Oil (1978) has summarized its proposed mining progression:

> Mining will begin in Area 2N and proceed south (Fig. 3). Subsequently boxcuts will be opened simultaneously in Areas 2S and 1W. Area 2S will be mined west while Area 1W is being mined south. Upon completion of mining in these two areas, Areas 1E and 3 will be opened and mined south and west, respectively.
>
> The simultaneous two-pit operation for the majority of the mining will (a) allow a gradual build-up of the work force; (b) allow "peaks" in the stripping ratio to be smoothed out by varying coal and/or overburden production from each pit; and (c) allow a gradual build-up of equipment. Figure 4 shows a sketch of typical mining operations looking northwest in Year 5 of the sequence, during mining in Area 2S. Mining elsewhere on-site will occur in a similar manner.
>
> Including the initial construction, the mine life is scheduled for a 26-year period, with initial plant and facilities construction beginning two years prior to coal production. Reclamation activities will begin with construction and will continue throughout the life of the mine.
>
> Coal production will begin with 3 million tons per year (MTPY) and increase to 9 MTPY in Years 5 and 6. Maximum production will be 15 MTPY in approximately Year 8. (p. 1.s-1.3)

As mentioned earlier, the final environmental impact statement found that no environmental resource would be significantly impacted beyond the area of the Caballo Rojo minesite. Following reclamation, the only environmental resource impacted in any major way would be the ground water system. However, OSM found the importance of impacts to the

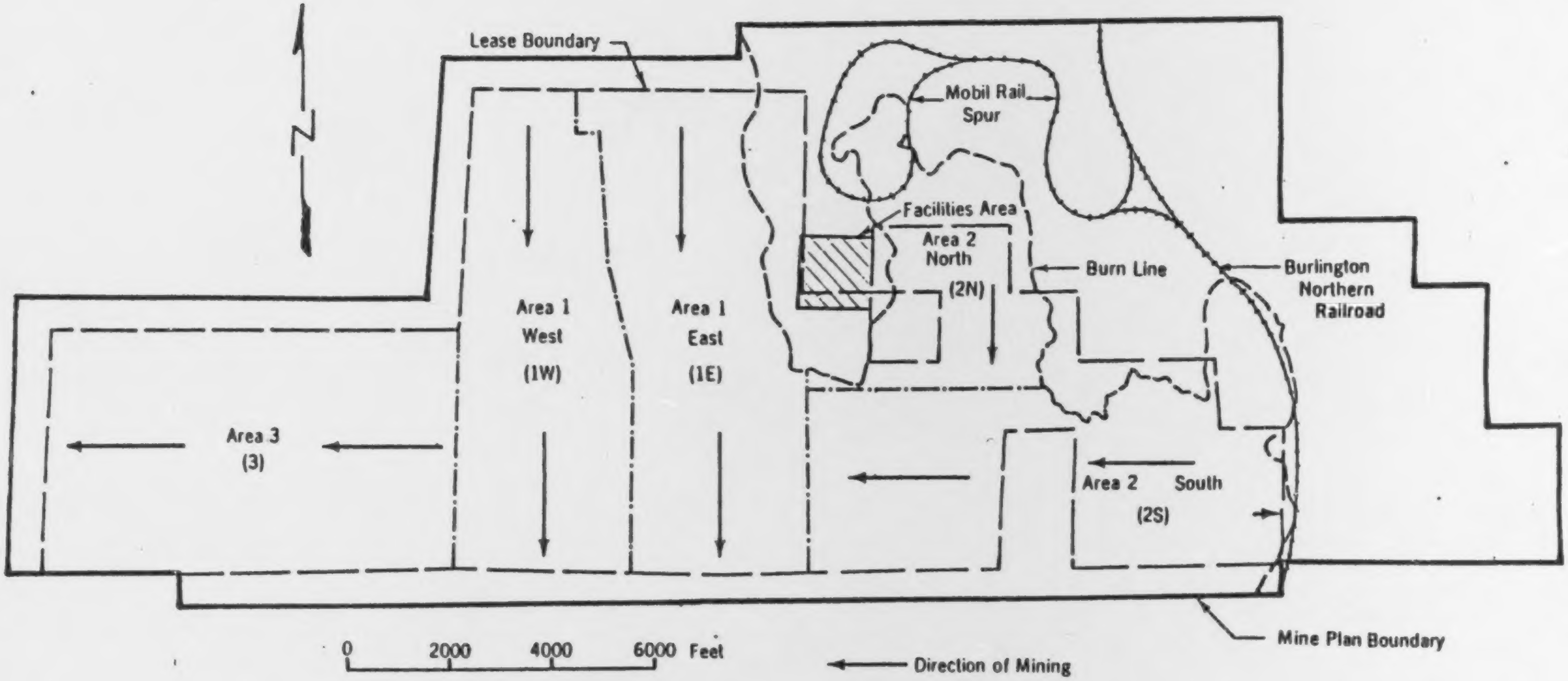

N
Lease Boundary
Mobil Rail Spur
Facilities Area
Area 2 North (2N)
Burn Line
Burlington Northern Railroad
Area 1 West (1W)
Area 1 East (1E)
Area 3 (3)
Area 2 South (2S)
Mine Plan Boundary
0 2000 4000 6000 Feet
Direction of Mining

Figure 3 -Lease and permit areas and direction of mining, Rojo Caballo mine.
(U.S. OSM, 1980, fig. I-2)

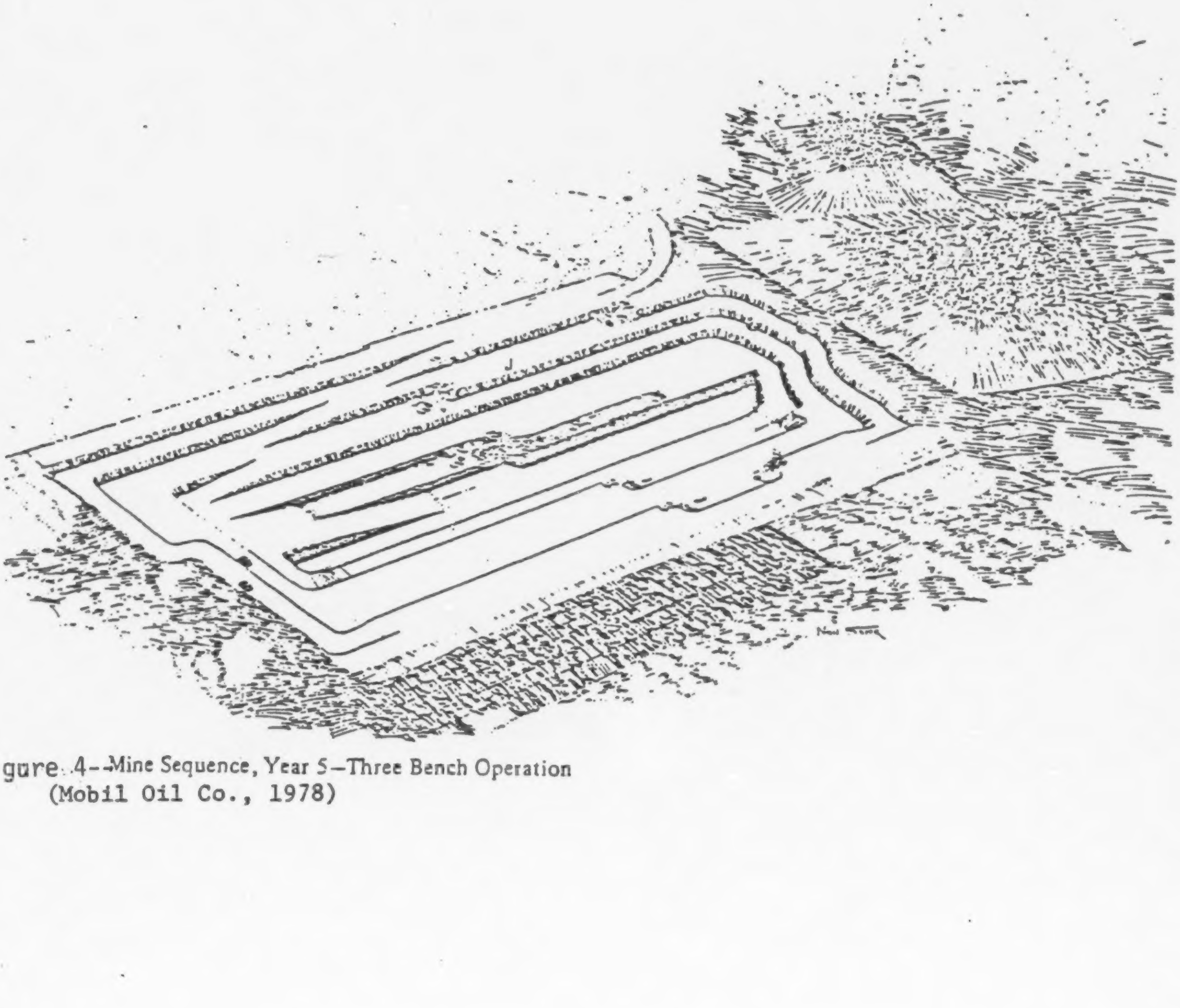


Figure 4--Mine Sequence, Year 5--Three Bench Operation
(Mobil Oil Co., 1978)

hydrologic system to be "insignificant" because changes in quantity and quality of both surface and ground water would not interfere with anticipated post-mining uses in the area. Important changes, albeit insignificant, will occur:

> Water levels in the Wasatch and Wyodak-Anderson coal aquifers would be lowered up to five miles from the mine by seepage into the pit. Pumping from deep wells for potable water could lower the potentiometric surface in the Fort Union formation as much as 16 feet five miles from the well. About 355 acre-feet of water would be used each year. After mining, it could take as much as 50 years for the water levels to recover. . . . Quality of the ground water would be slightly poorer but the water would still be acceptable for the anticipated post-mining grazing and wildlife use.
> (U. S. Office of Surface Mining, 1980, p. IV-8)

In light of these impacts, Mobil Oil will be required to monitor ground water quality and levels during and after mining activities.

Chemically deleterious overburden will be required to be buried a minimum of four feet below non-toxic spoil material, exclusive of topsoil. Other requirements of the OSM approval, of which there are 38 in total, include stipulations in such areas of concern as surface water hydrology, management of mine water discharges, recovery of coal, air quality monitoring, and vegetation.

REFERENCES

Boettger, West. 1980. Personal communication: Mobil Oil Corp. Environment Manager for Coal and Synthetic Fuels, telephone interview, November 4.

Mobil Oil Company. 1978. Mine permit application, Caballo Rojo Mine.

U. S. Office of Surface Mining. 1981. Final environmental impact statement, proposed mining and reclamation plan, Caballo Rojo Mine: U. S. Office of Surface Mining report OSM-EIS-3.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
CABALLO ROJO MINE	MOBIL OIL CORP. (THE MOBIL CORP.)	W-23929	3160	47N71W2, 3, 8, 9, 10, 11, 12	2/1/1971	$5/a	17.5¢/TON	DEVELOPING
		W-58112	840 a	47N71W 4, 5, 8, 9	2/1/1971	$5/a	17.5¢/TON	

W-23929
840 a. SEGREGATED TO FORM W58112, 2/1/1977

W-58112
CREATED OUT OF W-23929
SEGREGATED TO CONSOLIDATION COAL CO (50%)
AND MOBIL OIL CO. (50%) 2/1/1977
REASSIGNED TO MOBIL OIL CO.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
CABALLO ROJO MINE	MOBIL OIL CORP.	W-23929	5815.20a			TRUCK/ SHOVEL	DEVELOPING	15 MTY
		W-58112	NO PROPOSED MINING AT PRESENT					

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 339.5 MT

RECOVERABLE: 321.4 MT

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY: FEE COAL NOT PRESENTLY PROPOSED FOR MINING.

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK CABALLO ROJO MINE	LESSEE(S) MOBIL OIL CORP.	NUMBER OF LEASES 2	DATE MINE OPENED: 1983 PROJECTED CLOSING DATE: 2007 REMAINING MINE LIFE: 24 YRS+
REMAINING RECOVERABLE RESERVES: FEDERAL: 439.5 NON-FEDERAL: 0		MINE DESIGN CAPACITY 15 MTY[1] RECOVERY RATE: 95%	CUMULATIVE PRODUCTION TO 1979: 0 1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	—	—	—
1981	—	—	—
1982	—	—	—
1983	3.0	3.0	2.6
1984	6.0	6.0	2.6
1985	9.0	9.0	2.6
1986	9.0	9.0	2.6
1987	11.0	11.0	2.6
1988	15.0	15.0	2.6
1989	15.0	15.0	2.6
1990	15.0	15.0	2.6
Post 1990	15.0	15.0	2.6 MTY
NOTES: 2007	12.1	9.5	

[1] INITIAL FACILITIES BEING CONSTRUCTED FOR 9 MTY. ADDITIONAL COAL STORAGE FACILITIES WILL BE BUILT BY 1987 TO INCREASE CAPACITY TO 15 MTY (US OSM, 1981)

DATA SOURCES:
GLASS, 1980
MOBIL, 1981

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Wyoming

REGION: Powder River

COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): Caballo Rojo

LESSEE(S) (OR OPERATOR): Mobil Oil

NUMBER OF LEASES IN BLOCK OR PLAN: 2

MINING METHOD: truck/shovel

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Wyodak							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	65							
BTU/LB	7675-8893							
SULFUR (%)	0.2-0.8							
ASH (%)	–							
MOISTURE (%)	–							
FIXED CARBON (%)	–							
VOLATILE (%)	–							
SEAM DEPTH	150							
IN-PLACE RESERVES	338.3							
RECOVERABLE RESERVES	321.4							
RECOVERY RATE	95%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	321.4	0	321.4 *	
	SURFACE	321.4	0	321.4	
	UNDERGROUND	0	0	0	

NOTES:

* ~100MM of reserves in W23923 will be proposed for recovery at a later date

All Figures Shown in Million Tons

210

COAL RESERVES CHARACTERISTICS

Mine Name: Cordero Mine

Lease Number(s): W8385

Location: Campbell County, Wyoming

Lessee: SUNOCO Energy Development Company (The Sun Company)

Operator: Cordero Mining Company

Proximity to Other Operations: Caballo Rojo Mine adjacent to north

First Coal Shipped: 1976

1979 Production: 3.8 mt

1980 Production: 6.6 mt

Ultimate Mine Design Capacity: 24 mty

Remaining Mine Life: 25 years

Mining Method: Truck/shovel

Recovery Rate: 96%

Permitted Mine Plan Area: 8,232 acres

Federal Lease Area Associated with Mine Plan: 6,560.0 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 60

Rank: Subbituminous

BTU/lb: 8,331

Sulfur (%): 0.33

Overburden Thickness: 160 ft

Overburden/Coal Ratio: 2.5

Reserves:

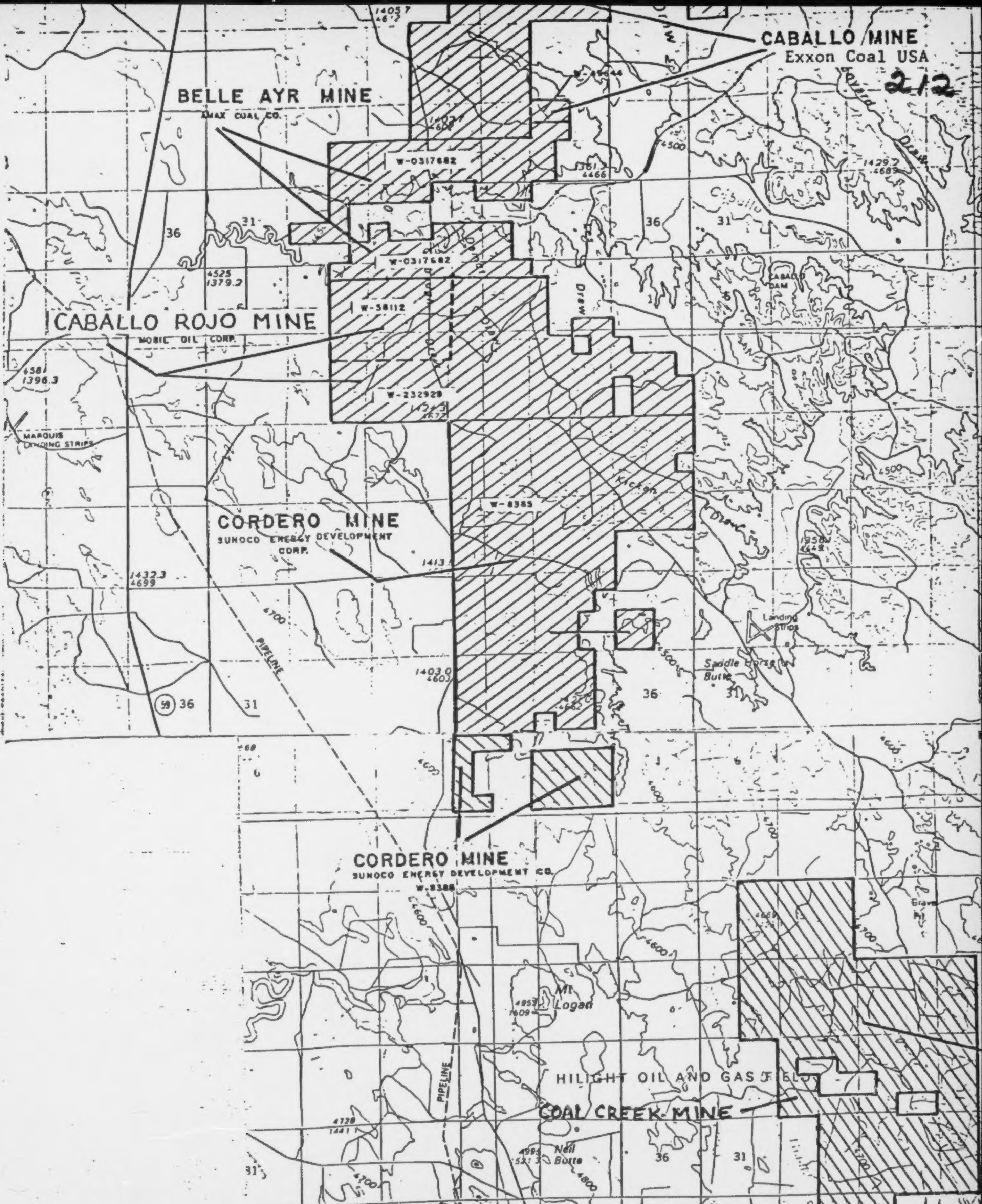
Total recoverable permitted mine plan (mt): 543

Total recoverable permitted federal in mine plan (mt): 543

Total recoverable federal in leaseblock: 543

Notes:

The Belle Fourche River and Coal Creek valley are potential alluvial valley floors. Although Cordero was operating prior to PL 95-87, Sunoco Energy Development Company must demonstrate its ability to reclaim the area.


CABALLO MINE
Exxon Coal USA
BELLE AYR MINE
AMAX COAL CO.
W-0317682
W-0317682
CABALLO ROJO MINE
MOBIL OIL CORP.
W-38112
W-232929
MARQUIS LANDING STRIPS
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CORP.
W-8385
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CO.
W-8385
PIPELINE
PIPELINE
Caballo
Caballo Dam
Draw
Kicken Draw
Landing Strips
Saddle Horse Butte
Mt Logan
Nell Butte
Gravel Pit
HILIGHT OIL AND GAS FIELD
COAL CREEK MINE
59
36
31
6
4500
4600
4700

CORDERO MINE

The Cordero Mine, which opened in 1976, is located about 19 miles southeast of Gillette, Wyoming. The mine is operated by Cordero Mining Company. The operation is focused on development of federal lease W-8385, held by Sunoco Energy Development Company (SunEDCo). The fee coal reserves underlying the Belle Fourche River are jointly owned by SunEDCo and a private individual, and are leased to Carter Oil Company. If the Carter lease expires in 1987 without development (as will probably occur), SunEDCo has the right of first refusal to lease the fee coal and propose development associated with the Cordero Mine. SunEDCo expects to mine this area after 2000, although alluvial valley floor concerns may affect such development.

The U. S. Geological Survey prepared a final environmental impact statement (EIS) on the Cordero mine plan in April 1976. The mine was included in the baseline evaluation in the Bureau of Land Management's EIS on the Eastern Powder River Coal issued in 1979.

Physical Environment

Topographically, the Cordero permit area can be divided into three distinct sections: the Belle Fourche River bottom, the breaks, and the uplands. The Belle Fourche River is an intermittent stream which flows northeasterly through the southern and eastcentral portions of the permit area. Sloping upward from the river is a deeply incised, actively eroding area, locally known as "breaks." The uplands are gently rolling.

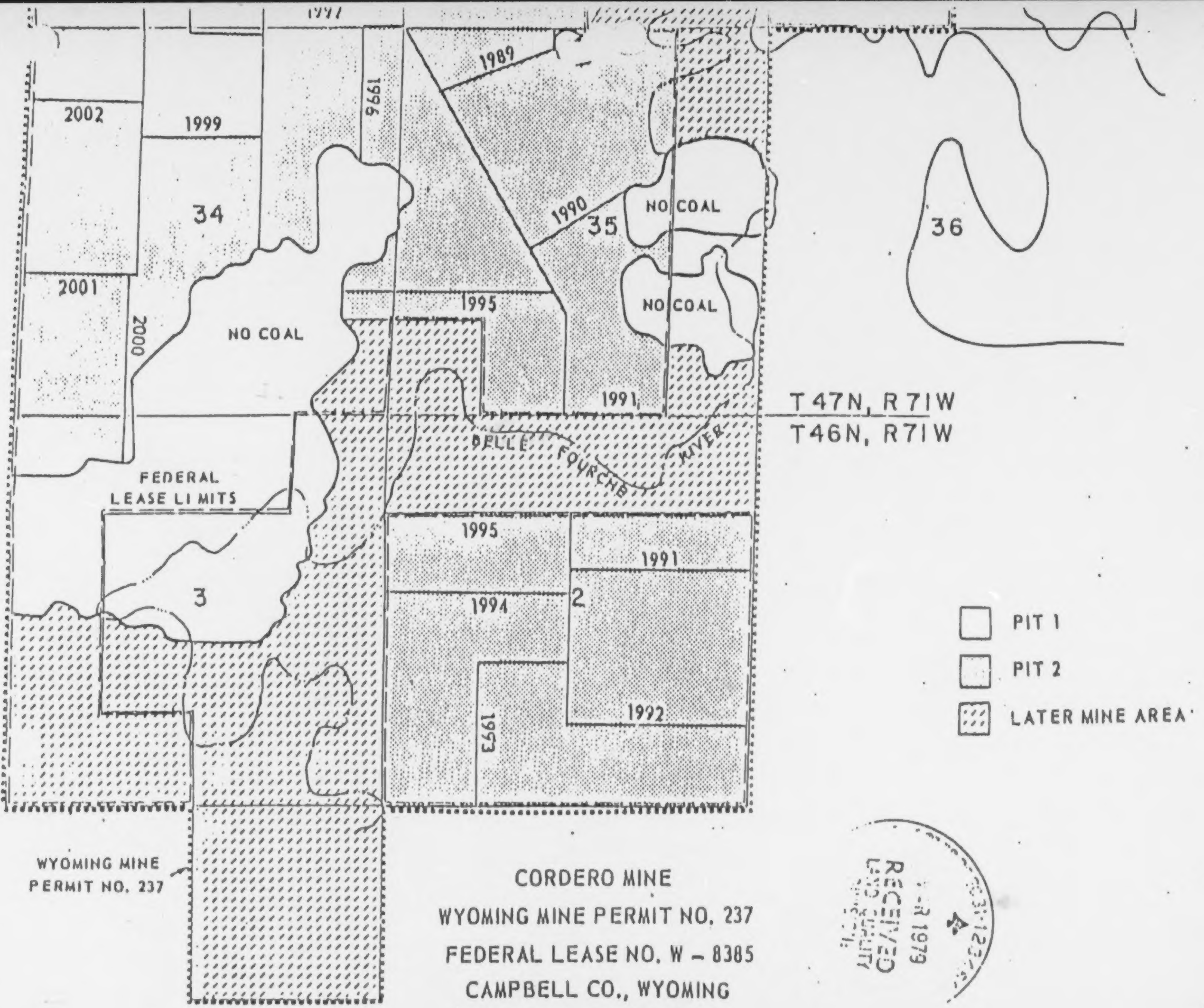
The Wyodak-Anderson seam at the Cordero Mine is part of the Tongue River member of the Fort Union formation. The overlying material of the Wasatch formation is mostly clay or clay shale, with intermittent sand stringers. Overburden ranges from 19 to 280 feet. The Wyodak-Anderson seam dips westerly at 1^0 to 3^0 and averages 58 feet in thickness. A rider seam, lying two to ten feet above the main seam, is found in part of the permit area. Since its thickness averages four feet, it will be recovered when encountered by mining. (Cordero, 1981).

Mining and Reclamation: Methods and Issues

Following topsoil removal, overburden is excavated using electrically powered shovels. Mining benches 45 feet high are used to remove the overburden. Presently, overburden is hauled behind the advancing pit and back-filled. Boxcut spoils have been located within the rail loop and have already been graded and topsoiled. A 600,000-cubic yard permanent spoil pile will also be created when a second pit is opened in 1982.

Facilities expansion to handle peak production of 24 mty is now complete. This includes 100,000-ton slot storage facilities, reversible conveyors, but may include another railroad loop in the future.

Cordero's mining sequence map (Fig. 1) shows pit development across the Belle Fourche River valley. Also, a "later mine area" is indicated for all portions of the Belle Fourche River valley. This "later mine area" is the area partly owned by SunEDCo which is planned for development after 2000. The Cordero Mine, as an operating mine established prior to passage of PL 95-87, is "grandfathered" from those provisions which prohibit mining of alluvial valley floors. However, the reclamation standards for mining these valleys have to be met.


1977
1989
2002
1999
1996
34
1990
35
NO COAL
NO COAL
36
2001
2000
NO COAL
1995
1991
T47N, R71W
T46N, R71W
BELLE FOURCHE RIVER
FEDERAL LEASE LIMITS
1995
1991
3
2
1994
1993
1992
PIT 1
PIT 2
LATER MINE AREA
WYOMING MINE PERMIT NO. 237

CORDERO MINE
WYOMING MINE PERMIT NO. 237
FEDERAL LEASE NO. W – 8385
CAMPBELL CO., WYOMING
MINING SEQUENCE MAP

SCALE: 1" = 2000' DATE: FEB. 1979

Figure 1

RECEIVED
-R 1979
LAND QUALITY

C-3

215

216

Cordero Mining (1981) has submitted data which seeks to demonstrate that the Belle Fourche valley is not an alluvial valley floor because valley areas are not subirrigated or flood irrigable. There is no indication whether the Wyoming Department of Environmental Quality (WDEQ) agrees with this analysis; however, smaller streams tributary to the Belle Fourche at the Coal Creek Mine have been designated alluvial valley floors.

REFERENCES

Cordero Mining Company. 1981. Mining and reclamation plan for Cordero Coal Mine.

STATE: WYOMING　　REGION: POWDER RIVER　　COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
CORDERO MINE	SUNOCO ENERGY DEVELOPMENT CO. (THE SUN CO., INC.)	W-8385	6560.	46N71W2,3 47N71W 13, 15, 22-27, 34, 35	3/1/71	$5/a.	17.5¢/TON	PRODUCING

ORIGINAL LESSEE CORDERO MINING

ASSIGNED TO SUN OIL CO. 6/1/1973

ASSIGNED TO SUNOCO ENERGY DEVELOPMENT CO. 1/1/1976

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL(PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
CORDERO MINE	SUNOCO ENERGY DEVELOPMENT CO.	W-8385	8231.85			TRUCK/ SHOVEL	PRODUCING	24 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 571.1 MT

RECOVERABLE: 543 MT

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY: 1

COMMENTS:

1 SUNEDCo & ANGELA BOOS OWN 65% AND 35% RESPECTIVELY OF 47N71W 10, 25, 26, 35; 46N71W 2, 3; CARTER OIL LEASES THIS AREA. SUNEDCO HAS RIGHT OF FIRST REFUSAL, AND PLANS TO MINE THE AREA IF THE CARTER LEASE EXPIRES. THE PRIMARY TERM OF CARTER'S LEASE IS DUE TO EXPIRE IN JULY 1987.

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING **REGION:** POWDER RIVER **COUNTY:** CAMPBELL

MINE NAME OR LEASE BLOCK CORDERO MINE	LESSEE(S) SUNOCO ENERGY DEVELOPMENT CO.	NUMBER OF LEASES 1	DATE MINE OPENED: 1976 PROJECTED CLOSING DATE: 2006 REMAINING MINE LIFE: 29 YEARS

REMAINING RECOVERABLE RESERVES:
FEDERAL: 543
NON-FEDERAL: 0

MINE DESIGN CAPACITY
24 MTY
RECOVERY RATE: 96%

CUMULATIVE PRODUCTION TO 1979: 5.1 MT
1979 ACTUAL PRODUCTION: 3,832,800 T

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	6.6	6.6	6.6
1981	8.0	8.0	8.0
1982	8.5	85	8.5
1983	10.0	10.0	10.0
1984	11.0	11.0	10.5
1985	13.0	13.0	10.5
1986	16.0	16.0	10.5
1987	19.0	19.0	10.5
1988	22.0	22.0	10.5
1989	23.0	23.0	10.5
1990	24.0	24.0	10.5
~~from~~ 1991 - 2005 2006	24.0 MTY 14.0	24.0 MTY 14.0	10.5 MTY

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

219

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

INE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
CORDERO	SUNOCO ENERGY DEVELOPMENT CO.	1	TRUCK/SHOVEL

OAL CHARACTERISTICS:	SEAM 1	SEAM 2 [1]	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	WYODAK-ANDERSON	RIDER [1]						
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS							
THICKNESS	60'	4'						
BTU/LB	8331	8000						
SULFUR (%)	.33	.67						
ASH (%)	5.9	9.42						
MOISTURE (%)	29	29						
FIXED CARBON (%)	33.79	29.21						
VOLATILE (%)	30.94	31.07						
SEAM DEPTH	19-280'	—						
IN-PLACE RESERVES	565.7	—						
RECOVERABLE RESERVES	543	—						
RECOVERY RATE	96%	100%						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL	565.7		565.7	
	SURFACE	565.7		565.7	
	UNDERGROUND	—		—	
RECOVERABLE:	TOTAL	543		543	
	SURFACE	543		543	
	UNDERGROUND	—		—	

NOTES:

[1] NOT ENCOUNTERED IN MINING TO DATE

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

COAL CONTRACT INFORMATION

MINE NAME: CORDERO STRIP MINE

COMPANY: CORDERO MINING COMPANY

COAL RESERVES: 516 million short tons

TOTAL CONTRACTED TONNAGE: 217.3 million short tons

MINE CAPACITY: 24 million short tons

CONTRACTED ANNUAL PRODUCTION: 10.4 million short tons

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
~~?Eastern Iowa Light and Power Coop.~~	~~Montpelier expansion, Montpelier, IA 25 MW; 0.09 myn tons/year ?Startup in 1979~~	~~1.8 myn tons[1]~~	~~0.09 myn tons~~	~~20 years[1]~~	~~?1979-1998~~				~~It would appear that this expansion may have been included as part of the Ottumwa No. 1 plant and that this contract doesn't exist~~
Iowa-Illinois Gas and Electric Co.	Louisa Plant, Muscatine, IA 650 MW; 2.3 myn tons/year Startup in 1983	46.0 myn tons[1]	2.3 myn tons	20 years	1982-2001				Contract announced in 1978; plant jointly owned by Iowa-Illinois Gas and Electric Co. (300 MW), Iowa Power and Light (211 MW), Iowa Public Service (100 MW), Eastern Iowa Light and Power (30 MW), and various municipalities
~~Iowa-Illinois Gas and Electric Co.~~	~~Unspecified plant or plants~~	~~14.0 myn tons[1]~~							~~May be for another plant or reserved to extend the Louisa contract beyond 20 years~~
Iowa Southern Utilities Co.	Ottumwa No. 1, Chillicothe, IA 675 MW; 2.0 myn tons/year Startup in 1981	40.0 myn tons	2.0 myn tons	20 years	1980-1999				Contract announced in 1978; plant jointly owned by Iowa Southern Utilities (225 MW), Iowa Public Service Co. (125 MW), Iowa-

Notes: [1] Estimated [2] FERC data

COAL CONTRACT INFORMATION

MINE NAME: CORDERO STRIP MINE (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price Per Ton	Delivered Price Cents/MMBTU	Miscellaneous Comments
									Illinois Gas and Electric (125 MW), Iowa Power and Light (100 MW), and Iowa Electric Light and Power (100 MW).
Missouri Basin Power Project	Laramie River No. 1, Wheatland, WY 500 MW; 2.0 myn tons/year Startup in 1980	30.0 myn tons	1.5 myn tons[1]	20 years	1979-1998				Contract announced in 1975; negotiated by Western Fuels Assoc., Inc.; plant jointly owned by Basin Electric Power Cooperative (210 MW), Tri-State Generation and Transmission Assoc. (120 MW), Missouri Basin Municipal Power Agency (85 MW), Lincoln Electric System (65 MW), Heartland Consumers Power Agency (15 MW), and Wyoming Municipal Power Agencies (5 MW)
	Laramie River No. 2, Wheatland, WY 500 MW; 2.0 myn tons/year Startup in 1980	30 myn tons	1.5 myn tons[1]	20 years	1980-1999				See notes above
San Antonio Public Service Board	J. T. Deely No. 1, Elmendorf, TX 418 MW; 1.5 myn tons/year[1] On line in 1976	27.8 myn tons[1]	1.5 myn tons[1]	20 years	1976-1995	$6.51[1] (1979)	$25.55[2] (1979)	153.9¢	Contract announced in 1973; 1979 rail rate $19.04

Notes:

COAL CONTRACT INFORMATION

MINE NAME: CORDERO STRIP MINE (Continued)

COMPANY:

COAL RESERVES:

TOTAL CONTRACTED TONNAGE:

MINE CAPACITY:

CONTRACTED ANNUAL PRODUCTION:

BUYER INFORMATION		CONTRACT SPECIFICATIONS							
Company Name	Plant (name, location, capacity, annual fuel requirement)	Total Tonnage Contracted	Average Tonnage Per Year	Duration of Contract	Startup and Completion	FOB Mine Price Per Ton	Delivered Price		Miscellaneous Comments
							Per Ton	Cents/ MMBTU	
San Antonio Public Service Board	J. T. Deely No. 2, Elmendorf, TX; 418 MW; 1.5 myn tons/year On line in 1978	27.8 myn tons[1]	1.5 myn tons	20 years	1978-1997	$6.51[1] (1979)	$25.55[2] (1979)	153.9¢	Contract announced in 1973; 1979 rail rate $19.04

Notes:

1.
13

223

Mine Name: Coal Creek Mine

Location: Campbell County, Wyoming

Lease Number(s): W3446

Lessee: Atlantic Richfield Company

Operator: Thunder Basin Coal Company

Proximity to Other Operations: Cordero Mine is three miles to northeast

First Coal Shipped: 1982

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 12 mty

Remaining Mine Life: 30 years

Mining Method: Truck/shovel, dragline

Recovery Rate: 95%

Permitted Mine Plan Area: 9,545 acres

Federal Lease Area Associated with Mine Plan: 5,806.3 acres

Pending Actions: Modification to mine plan to permit use of dragline

---

Coal Data

Seam Name(s): Wyodak No. 1,
Wyodak No. 3

Thickness (ft): 23 (No.1)
10 (No. 3)

Rank: Subbituminous

BTU/lb: 8,090 (No. 1)
7,820 (No. 3)

Sulfur (%): 0.32 (No. 1)
0.39 (No. 3)

Overburden Thickness: 10-175 ft

Overburden/Coal Ratio: 2.4

Reserves:

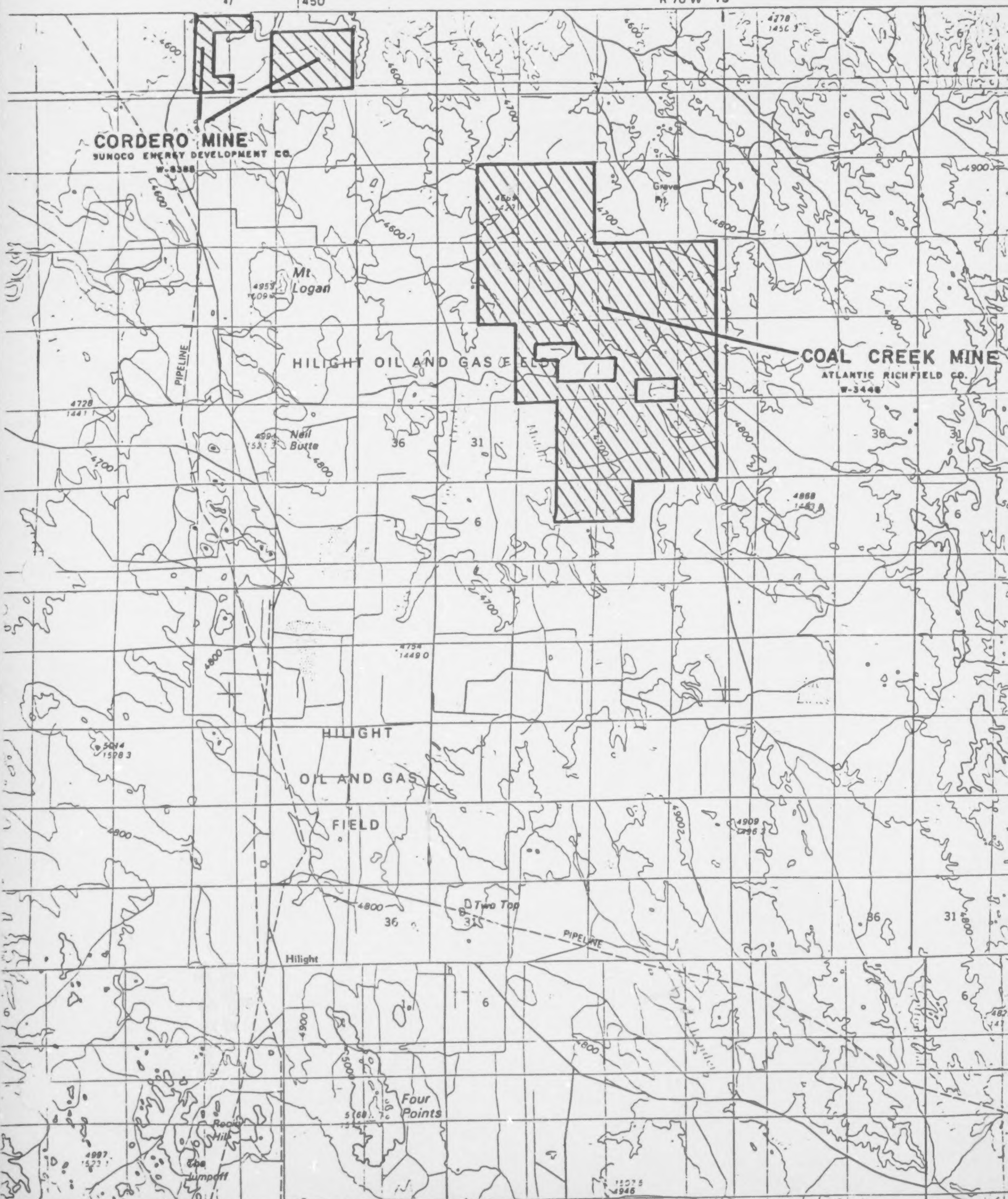
Total recoverable permitted mine plan (mt): 315

Total recoverable permitted federal in mine plan (mt): NA

Total recoverable federal in leaseblock: C

Notes:

Mining has not been approved in any alluvial valley floor areas. ARCO must demonstrate that these areas can be reclaimed or that they will not be affected. Otherwise, mining must cease by December 31, 1983. Because coal quality varies as much as 1,000 BTUs in the lease block, a two-pit mine plan has been developed to allow blending.


R 71 W
47
450
R 70 W
48
15'
CORDERO MINE
SUNOCO ENERGY DEVELOPMENT CO.
W-8388
COAL CREEK MINE
ATLANTIC RICHFIELD CO.
W-3446
HILIGHT OIL AND GAS FIELD
Mt. Logan
Neil Butte
Gravel Pit
PIPELINE
Two Top
Hilight
Four Points
Rocky Hill
The Jumpoff
4600
4700
4800
4900
5000

COAL CREEK MINE

The Thunder Basin Coal Company, a subsidiary of the ARCO Coal Company, in turn a subsidiary of the Atlantic Richfield Company, is developing the Coal Creek Mine, located about 25 miles south of Gillette, Wyoming. Initially, shipping of coal was expected in 1980; however, coal from the mine will not be available until 1982. Coal that was to be delivered in 1980-1982 is being provided by the Black Thunder Mine. Approval for mining was obtained in early 1979, after review by the State of Wyoming and preparation of an environmental assessment and technical analysis by the U. S. Office of Surface Mining (OSM). (Lindsay and Hardaway, 1979) In addition, the U. S. Geological Survey (1979) prepared a final environmental impact statement.

The mine plan includes development of the 5,800-acre federal lease W-3446, but coal reserves owned by the State of Wyoming and by private individuals will also be developed (Fig. 1). Federal reserves constitute about 86 percent of the leased acreage.

OSM's approval of the Coal Creek mine plan was conditioned on ARCO Coal's acceptance of 15 special stipulations. (OSM, 1979) The most significant of these centered on the issue of mining impacts to several alluvial valley floors which were identified on the federal lease surface. OSM has stated that mining will cease on January 1, 1984 unless the regulatory authority has determined by that time that operations will not adversely affect alluvial valley floors and/or that certain alluvial valley floors can be successfully mined and reclaimed.

COAL CREEK MINE

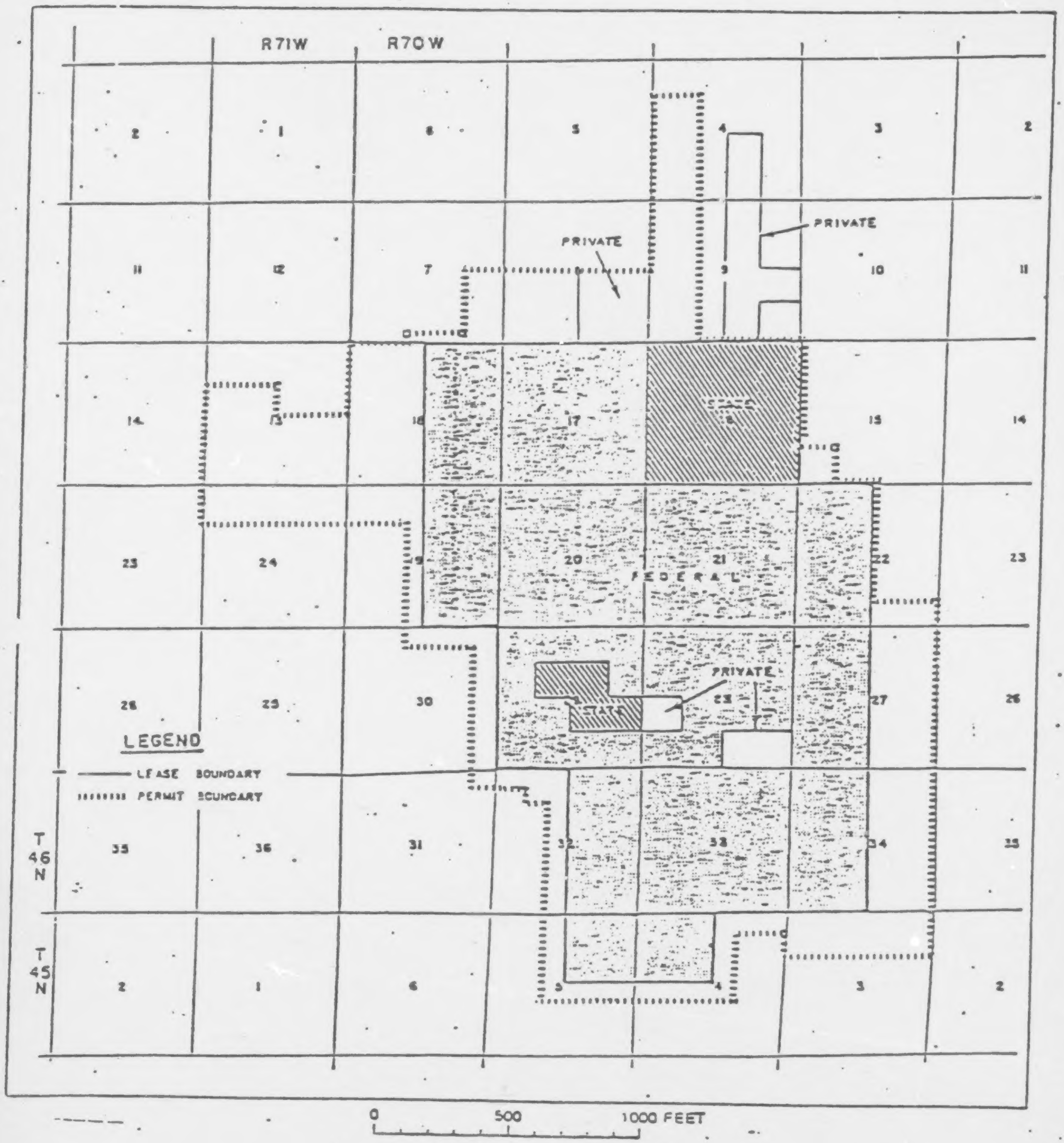

R71W
R70W
2
1
6
5
4
3
2
11
12
7
PRIVATE
9
PRIVATE
10
11
14
13
18
17
STATE
16
15
14
23
24
19
20
FEDERAL
21
22
23
26
25
30
STATE
PRIVATE
28
27
26
LEGEND
LEASE BOUNDARY
PERMIT BOUNDARY
T 46 N
35
36
31
32
33
34
35
T 45 N
2
1
6
5
4
3
2
0
500
1000 FEET

Figure 1 Permit Area (ARCO, 1980)

East Fork Coal Creek, one of the designated alluvial valleys, bisects the mine plan area. If ARCO Coal cannot demonstrate successful reclamation and the area is prohibited from mining, the mining project would become uneconomic, according to Thunder Basin Coal Company president Charles B. Smith (1980). Hydrologic studies have been conducted and reports submitted to the State of Wyoming and OSM in December 1980. The State and OSM are reviewing this application for compliance with the 1979 stipulations.

Smith has stated that Thunder Basin Coal never anticipated that East Fork Coal Creek, and smaller drainages, would be designated alluvial valley floors. In light of the fact that Thunder Basin Coal has continued to proceed with its mine development, the company must feel fairly confident that the alluvial valley floor issue will be resolved in its favor.

Some parts of Coal Creek are naturally subirrigated but according to ARCO Coal (1980), these areas are discontinuous or of limited areal extent. Some other valley areas were previously cultivated, but these areas are now abandoned and are not proposed for mining. ARCO Coal estimates that the total area of naturally subirrigated terraces is less than 15 acres, and that saline soils limit irrigation development.

Background

Federal lease W-3446 was obtained in November 1967. A final environmental impact statement was released by the U. S. Geological Survey on January 18, 1979. Since the environmental impact statement did not address compliance with PL 95-87, OSM conducted its own evaluation, which was completed February 26, 1979.

Physical Environment

Topography of the Coal Creek permit area is typical of the topography of southern Campbell County. Small buttes occur where resistant clinker is present or where hard sandstone outcrops. The mine plan area lies principally within the Coal Creek drainage basin, an ephemeral tributary of the Belle Fourche River. The major drainage of the area is the East Fork of Coal Creek.

Two of the nine coal seams identified on the federal lease are considered commercially mineable at 85-95% recovery--the Wyodak-Anderson No. 1 and No. 3 beds. Together these seams average 33 feet in thickness, and lie under overburden ranging in thickness between ten and 175 feet. The Wyodak-Anderson No. 1 and No. 3 beds are separated by a clay parting one to six feet in thickness. The Wyodak-Anderson No. 3 splits in the central and eastern portions of the mine area and the lower split is very erratic and grades into coaly clay. ARCO Coal has identified the Wyodak-Anderson No. 5 seam as potentially mineable and marketable (with 75% recovery), but is not proposing recovery at this time.

Mining and Reclamation: Methods and Issues

Because coal quality varies as much as 1,000 BTUs in the lease block, a two-pit mine plan has been developed to allow blending. Mining will commence by opening a cut near the burn line in the northeastern part of the lease. Mining will proceed from north to south in a zigzag pattern with two open pits at any one time. About 2,000 feet of railroad spur and access road lie over recoverable coal in the northwest corner of the lease. Therefore, this area will be the last area mined.

Although earlier plans had called for an exclusive truck/shovel mining method, Thunder Basin Coal now also plans to utilize a dragline in its overburden stripping plans. Two electric draglines (capacity 35-50 cubic yards) will be used at peak production. Thunder Basin Coal will also use three electric shovels, 24 haul trucks for overburden and coal removal, and conveyor system (Fig. 2).

During the first five years of mining, surrounding water levels in bedrock aquifers will be drawn down. Long-term impacts of mining the entire lease block have not been evaluated by OSM or the State. Unresolved questions revolve around alluvial valley floors, as discussed earlier, and the combined effect of lowering the reclaimed land surface and potentially raising the water table, thus creating marsh areas. This situation may occur where confining layers in aquifers are broken by mining. The overburden is high in clay content and boron, and has a high acid potential. Finding suitable material for backfill may be a problem.

OSM (1979) found that topsoil and revegetation requirements of PL 95-87 would be met. ARCO Coal is proposing to irrigate reclamation sites when the growing season rainfall is below the long-term average.

The USGS (1979) identified socioeconomic impacts as the most significant impact of the mine. These impacts include rapid increases in population and employment, resulting in demand for goods and services. OSM (1979) also expressed concern about the mitigation of these impacts, but recommended only that a loan program be developed between the federal government and the City of Gillette. Since that time, OSM has been working with the Wyoming Industrial Siting Council to insure that mitigation measures are developed by ARCO as well as other mining companies in the Gillette area to mitigate cumulative socioeconomic impacts.

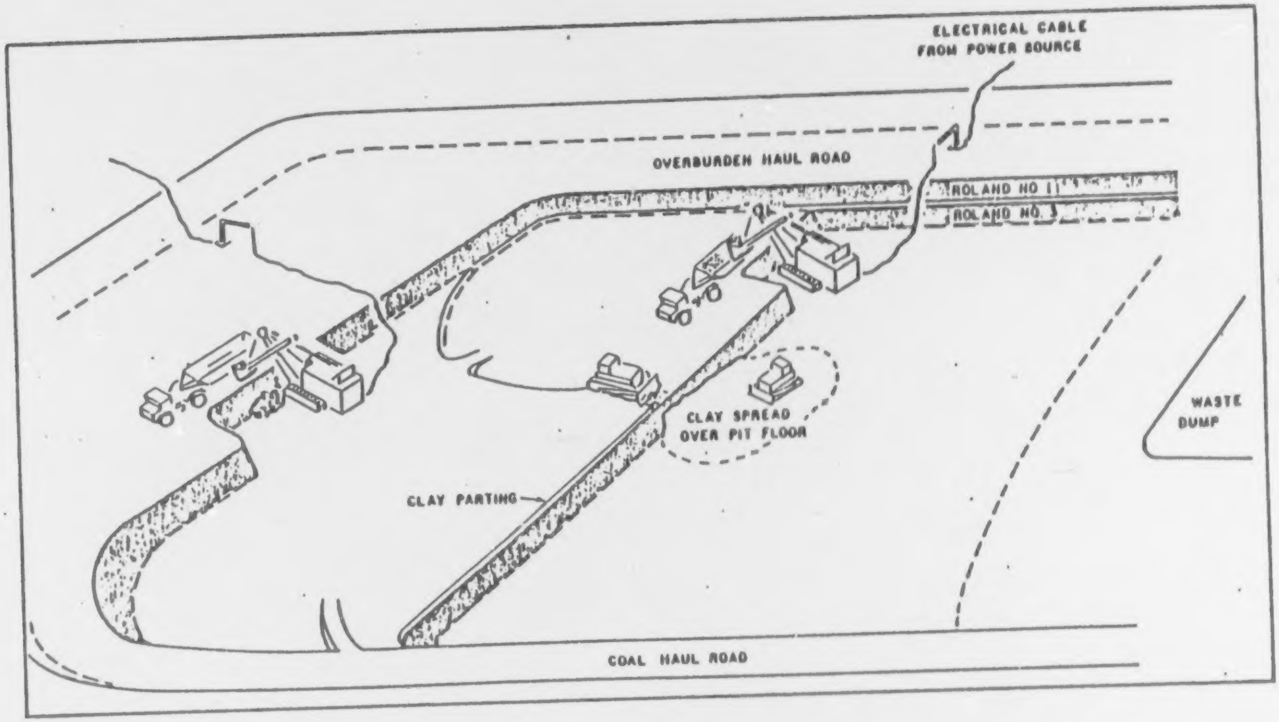

ELECTRICAL CABLE FROM POWER SOURCE
OVERBURDEN HAUL ROAD
ROLAND NO 1
ROLAND NO 3
WASTE DUMP
CLAY SPREAD OVER PIT FLOOR
CLAY PARTING
COAL HAUL ROAD

Figure 3 --Conceptual diagram showing overburden removal, typical coal loading, and parting removal. (ARCO, 1980)

REFERENCES

ARCO Coal Company. 1980. Mining and reclamation plan.

Lindsay, Shirley, and Hardaway, John. 1979. Environmental assessment, new mining and reclamation plan, Coal Creek Mine: OSM staff report.

Smith, Charles B. 1980. Personal communication: President, Thunder Basin Coal Company, telephone interview, November 10.

U. S. Office of Surface Mining. 1979. Special stipulations, Coal Creek mining and reclamation plan, 5 p.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
COAL CREEK MINE	ATLANTIC RICHFIELD CO.	W-3446	5806.28a	45N70W4,5 46N70W17,18, 19, 20, 21, 22, 27, 28, 29, 32, 33, 34	11/1/67	$1.00/a	20¢/TON	DEVELOPING

LEASE REFERENCE INDEX

STATE: WYOMING REGION: POWER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
COAL CREEK MINE	ATLANTIC RICHFIELD CO.	W3446	9545a	SURFACE		DRAGLINE, TRUCK/SHOVEL	DEVELOPING	12 MTY
				609	8936			
				COAL				
				8800	920			

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 333

RECOVERABLE: 315

SOURCE: ARCO, 1981

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF WYOMING
FEE (SEVERAL INDIVIDUALS)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK: COAL CREEK MINE

LESSEE(S): ATLANTIC RICHFIELD CO.

NUMBER OF LEASES: 1

DATE MINE OPENED: 1982

PROJECTED CLOSING DATE: 2012

REMAINING MINE LIFE: 31

REMAINING RECOVERABLE RESERVES:

FEDERAL:

NON-FEDERAL:

MINE DESIGN CAPACITY: 12 MTY

RECOVERY RATE: 95%

CUMULATIVE PRODUCTION TO 1979: 0

1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	—	—	—
1981	—	—	—
1982	1.4	1.4	1.4
1983	3.7	3.7	3.7
1984	6.0	6.0	4.8
1985	7.8	7.8	4.8
1986	9.8	9.8	4.8
1987	11.4	11.4	4.8
1988	12.0	12.0	4.8
1989	12.0	12.0	4.8
1990	12.0	12.0	4.8
Post 1990	12.0 MTY	12.0 MTY	4.8 MTY

NOTES:

DATA SOURCES:
GLASS, 1980
ARCO, 1980

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
COAL CREEK MINE	THUNDER BASIN COALCO.	1	DRAGLINE, TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	WYODAK-ANDERSON 1	WYODAK-ANDERSON 3	WYODAK-ANDERSON 5					
FORMATION	FORT UNION							
RANK	SUBBITUMINOUS							
THICKNESS	14-21.7	10.7	3.8					
BTU/LB	8080	7820	x 7395					
SULFUR (%)	x 0.32	0.39	0.38					
ASH (%)								
MOISTURE (%)	COAL QUALITY DATA							
FIXED CARBON (%)	CONFIDENTIAL							
VOLATILE (%)								
SEAM DEPTH								
IN-PLACE RESERVES	333		—					
RECOVERABLE RESERVES	315		—					
RECOVERY RATE	95%	95%	—					

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL			333[1]	
	SURFACE			—	
	UNDERGROUND			—	
RECOVERABLE:	TOTAL			315	
	SURFACE			315	
	UNDERGROUND			—	

NOTES:

[1] ~~ARCO COAL, 1978 CITES MINE PLAN IN-PLACE AS 333 MT, RECOVERABLE RESERVES~~ 315 MT

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Jacobs Ranch Mine

Lease Number(s): W23928
W24710

Location: Campbell County, Wyoming

Lessee: Kerr-McGee Coal Corp.
(Kerr-McGee Corp.)

Operator: Kerr-McGee Coal Corp.

Proximity to Other Operations: Black Thunder Mine is adjacent to south

First Coal Shipped: 1978

1979 Production: 4.7 mt

1980 Production: 8.2 mt

Ultimate Mine Design Capacity: 16 mty

Remaining Mine Life: 21 years

Mining Method: Truck/shovel

Recovery Rate: 90%

Permitted Mine Plan Area: 4959.3 acres

Federal Lease Area Associated with Mine Plan: 4351.8 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 55

Rank: Subbituminous

BTU/lb: 8600

Sulfur (%): 0.48

Overburden Thickness: 88 ft.

Overburden/Coal Ratio: 2:1

Reserves:

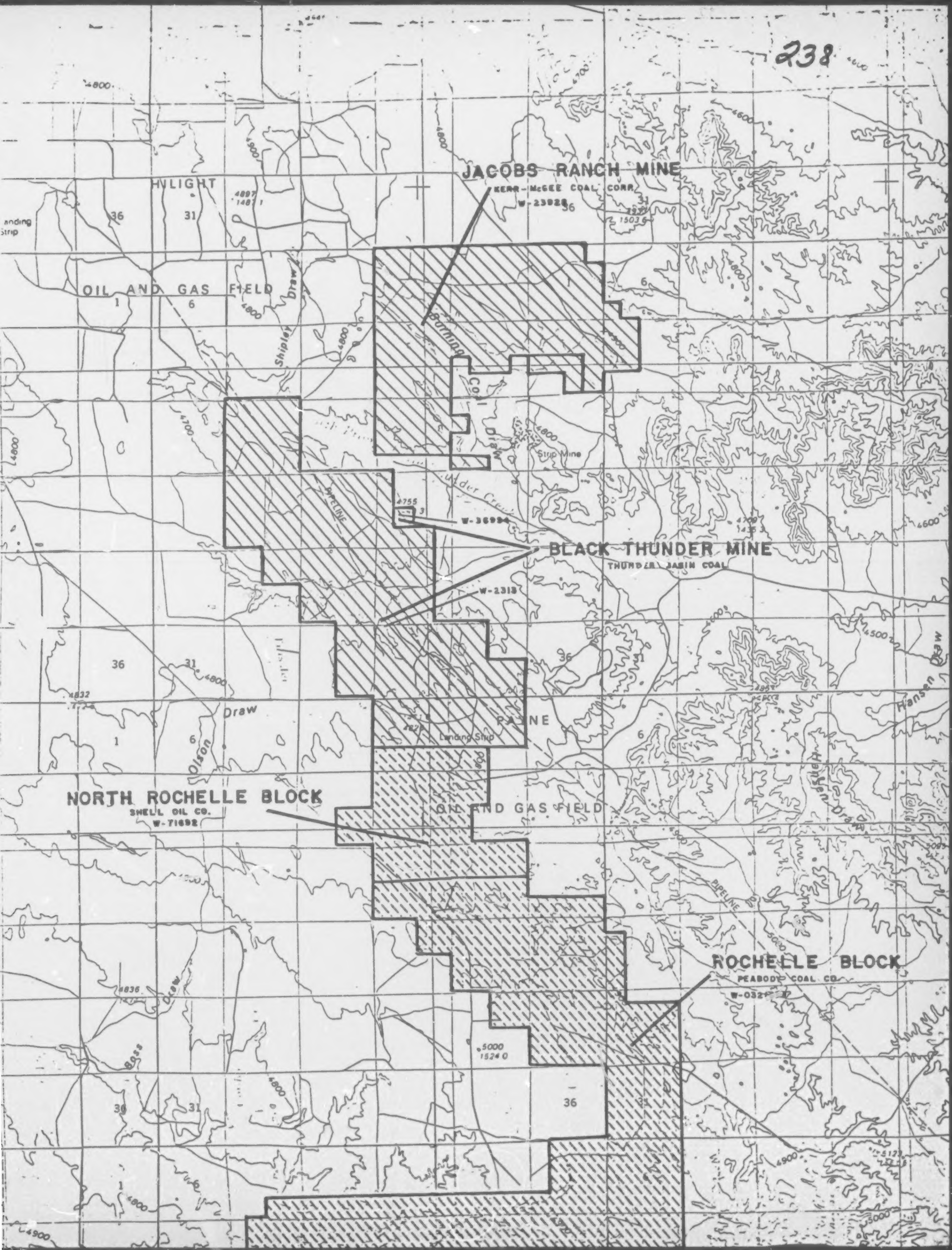
Total recoverable permitted mine plan (mt): 304

Total recoverable permitted federal in mine plan (mt): 304

Total recoverable federal in leaseblock: 304

Notes:

Located in Thunder Basin National Grassland.
Alluvial valley floor concerns are minor.


JACOBS RANCH MINE
KERR-McGEE COAL CORP.
W-23928
BLACK THUNDER MINE
THUNDER BASIN COAL
W-36994
W-2313
NORTH ROCHELLE BLOCK
SHELL OIL CO.
W-71692
ROCHELLE BLOCK
PEABODY COAL CO.
W-032
HILIGHT
OIL AND GAS FIELD
OIL AND GAS FIELD
Landing Strip
Landing Strip
Strip Mine
PIPELINE
PIPELINE
Shipley Draw
Coal Draw
Alder Creek
Olson Draw
Draw
Hansen Draw
Draw
Draw
PAINE
4755
4800
4700
4600
4500
4900
5000
1503.6
1435.3
1524.0

JACOBS RANCH MINE

The Jacobs Ranch Mine is a truck/shovel mine operated by the Kerr-McGee Coal Corporation, a wholly-owned subsidiary of the Kerr-McGee Corporation. The mine is located in the Thunder Basin National Grassland of southeastern Campbell County, Wyoming, 52 miles south-southeast of Gillette. Federal lease W-23928 was acquired by Kerr-McGee Corporation on September 1, 1970. Initial mine construction began in 1974. Stripping operations began in August 1976 and the first coal was shipped in February 1978. All mine facilities have been constructed at a design capacity of 16 mty.

Physical Environment

The Jacobs Ranch Mine is located on the eastern edge of the gently rolling upland formed by the Wasatch formation. The eastern and southern sides of the mine site are severely eroded clinker areas. North Prong Little Thunder Creek flows through the extreme southern part of the permit area, while Burning Coal Draw, a tributary of North Prong, flows through much of the permit area. The total permit acreage considered to be stream valley is small, however. (Kerr-McGee Coal, 1981) Both streams are ephemeral and have already been affected by construction of the railroad and plant facilities. The valleys widen out beyond the permit area. Little Thunder Creek and North Prong could have up to about 90 acres of unconsolidated stream-laid deposits downstream of the mine area, according to recent studies conducted by Kerr-McGee (1981). Subirrigated areas along Burning Coal Draw are caused by water seepage from a reservoir or from discharge from clinker areas. The two streams in question are being evaluated under alluvial valley floor criteria, although preliminary indications are that neither valley within the permit area will be designated an alluvial valley floor.

The Jacobs Ranch Mine has one main seam, the Wyodak-Anderson, which splits into two and three seams (Fig. 1). Because of sales contracts, blending is necessary and is accomplished by two operating pits. High quality coal from one pit is mixed with lower quality coal from another pit. The coal is classed as sub-bituminous C coal, and estimated mine plan recoverable reserves total 304 million tons. (Kerr-McGee Corp., 1981)

In the eastern portion of the permit area, the lowermost split of the Wyodak-Anderson seam will not be recovered because (1) the stripping ratio exceeds the economic limit of 10:1, (2) generally the heating value is less than 8,200 BTU/lb, and (3) the sulfur content exceeds 0.5%. More detailed study at a later time may lead to proposals for mining development of this seam. (Kerr-McGee Corp., 1979, p. 3)

Mining and Reclamation: Methods and Issues

Coal is mined from two separate pits, each by the truck/shovel method. Overburden is normally excavated by 25-cubic yard shovels. The shovels are operated on benches 30 to 50 feet high and about 200 feet wide. A stair-step profile of benches extends along one side of each operating pit. To date, very limited amounts of toxic or acid-forming overburden strata have been identified.

Out-of-pit spoil piles have been established at the mine to store boxcut material. Over 11 million cubic yards of spoil will be permanently stored on unmined surface. All other spoils will be back-filled into

JR-3

TYPICAL COAL-OVERBURDEN SECTION

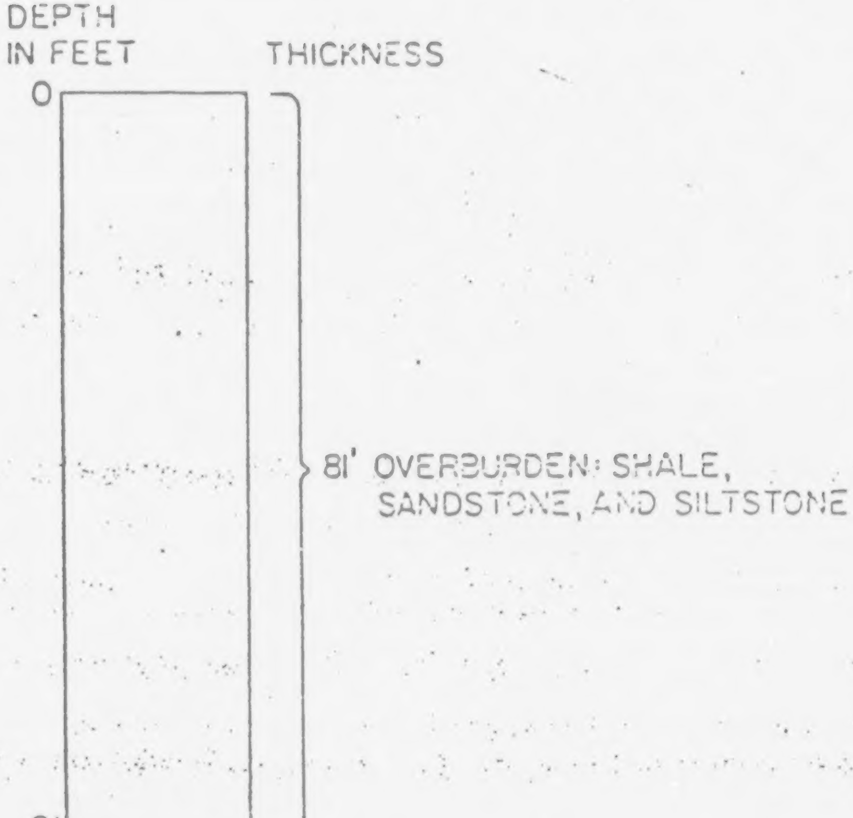

DEPTH IN FEET
THICKNESS
0
81
88
96
101
142
145
151
81' OVERBURDEN: SHALE, SANDSTONE, AND SILTSTONE
7' SHALY COAL
8' UPPER WYODAK
5' SHALE AND SANDSTONE
41' MIDDLE WYODAK
3' SHALE
6' LOWER WYODAK

Figure 1

previously mined portions of the pits. Each pit will be regraded during reclamation so that the surface freely drains. (Kerr-McGee Corp., 1980)

After blasting, coal is removed either by 20- to 40-cubic yard shovels or by a hydraulic excavator. Because the top few feet of the Wyodak-Anderson seam has a higher sulfur content than the rest of the seam, the top is selectively excavated for later blending. The last few feet of coal are usually very wet and are excavated by either dragline or backhoe.

REFERENCES

Kerr-McGee Coal Corporation. 1981, 1979. Mine permit update, Jacobs Ranch Mine.

STATE: WYOMING   REGION: POWDER RIVER   COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
JACOBS RANCH MINE	KERR-MCGEE COAL CORPORATION (KERR-MCGEE CORP.)	W-23928	4191.84 a	43N69W6,7 43N70W1, 2, 3, 10, 11, 13, 14, 15.	9/1/1970	$1/a	20¢/TON	PRODUCING
		W-24710	160 a	43N70W12	–	$1/a	20¢/TON	

STATE: WYOMING **REGION:** POWDER RIVER **COUNTY:** CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
JACOBS RANCH MINE	KERR-MCGEE COAL CORP.	W-23928 W-24710	4959.3a	4351.8	607.5	TRUCK/ SHOVEL	PRODUCING	16 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 346.7

RECOVERABLE: 304

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

KERR-McGEE COAL CORPORATION
PRIVATE

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK: JACOBS RANCH MINE

LESSEE(S): KERR-McGEE COAL CORP.

NUMBER OF LEASES: 2

DATE MINE OPENED: 1978
PROJECTED CLOSING DATE: 2002
REMAINING MINE LIFE: 21 YEARS

REMAINING RECOVERABLE RESERVES:
FEDERAL: 304
NON-FEDERAL: 0

MINE DESIGN CAPACITY: 16 MTY'
RECOVERY RATE: 90%

CUMULATIVE PRODUCTION TO 1979:
1979 ACTUAL PRODUCTION: 4,681,245 T

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	8.2	8.2	8.2
1981	10.2	10.2	10.2
1982	13.2	13.2	13.2
1983	14.0	14.0	14.0
1984	13.9	13.9	13.9
1985	13.9	13.9	13.9
1986	15.6	15.6	15.6
1987	15.6	15.6	15.6
1988	15.8	15.8	15.8
1989	15.5	15.5	15.5
1990	15.5	15.5	15.5
Post ~~1990~~ 1991-1993	15.5	15.5	15.5
1994	15.2	15.2	15.2
1995	15.0	15.0	15.0
1996 - 1998	15.2	15.2	15.2
1999	12.3	12.3	12.3
2000	8.9	8.9	8.9
2001	10.5	10.5	10.5
2002	5.5	5.5	5.5

NOTES:

DATA SOURCES:
GLASS, 1980
KERR-McGEE, 1981

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

INE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
JACOB RANCH MINE	KERR-McGEE COAL CORPORATION	2	TRUCK / SHOVEL

OAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
EAM NAME	WYODAK-ANDERSON[1]							
ORMATION	TONGUE RIVER MEMBER, FORT UNION FORMATION							
ANK	SUBBITUMINOUS C							
THICKNESS	55'							
BTU/LB	8600							
SULFUR (%)	0.48							
ASH (%)	5.89 %							
OISTURE (%)	28.90							
FIXED CARBON (%)	33.87							
VOLATILE (%)	31.40							
SEAM DEPTH	88'							
IN-PLACE RESERVES	346.7							
RECOVERABLE RESERVES	304							
RECOVERY RATE	90%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL	346.7 MT			
	SURFACE	346.7 MT			
	UNDERGROUND	0			
RECOVERABLE:	TOTAL	304 MT[2]			
	SURFACE	304 MT			
	UNDERGROUND	0			

NOTES:

[1] MAY OCCUR AS 1, 2, OR 3 SEAMS

[2] NO PROPOSED RECOVERY OF COAL IN W-24710

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Black Thunder Mine

Lease Number(s): W2313
W36094

Location: Campbell County, Wyoming

Lessee: Thunder Basin Coal Company (Atlantic Richfield Co.)

Operator: Thunder Basin Coal Company

Proximity to Other Operations: Jacobs Ranch Mine adjacent to northeast

First Coal Shipped: 1977

1979 Production: 6.2 mt

1980 Production: 10.5 mt

Ultimate Mine Design Capacity: 20.5 mty

Remaining Mine Life: 35 years

Mining Method: Truck/shovel

Recovery Rate: 95%

Permitted Mine Plan Area: 7,659.9 acres

Federal Lease Area Associated with Mine Plan: 5,884.3 acres

Pending Actions:

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 66

Rank: Subbituminous

BTU/lb: 8,665

Sulfur (%): 0.33

Overburden Thickness: 123 ft

Overburden/Coal Ratio: 1.9

Reserves:

Total recoverable permitted mine plan (mt): 709

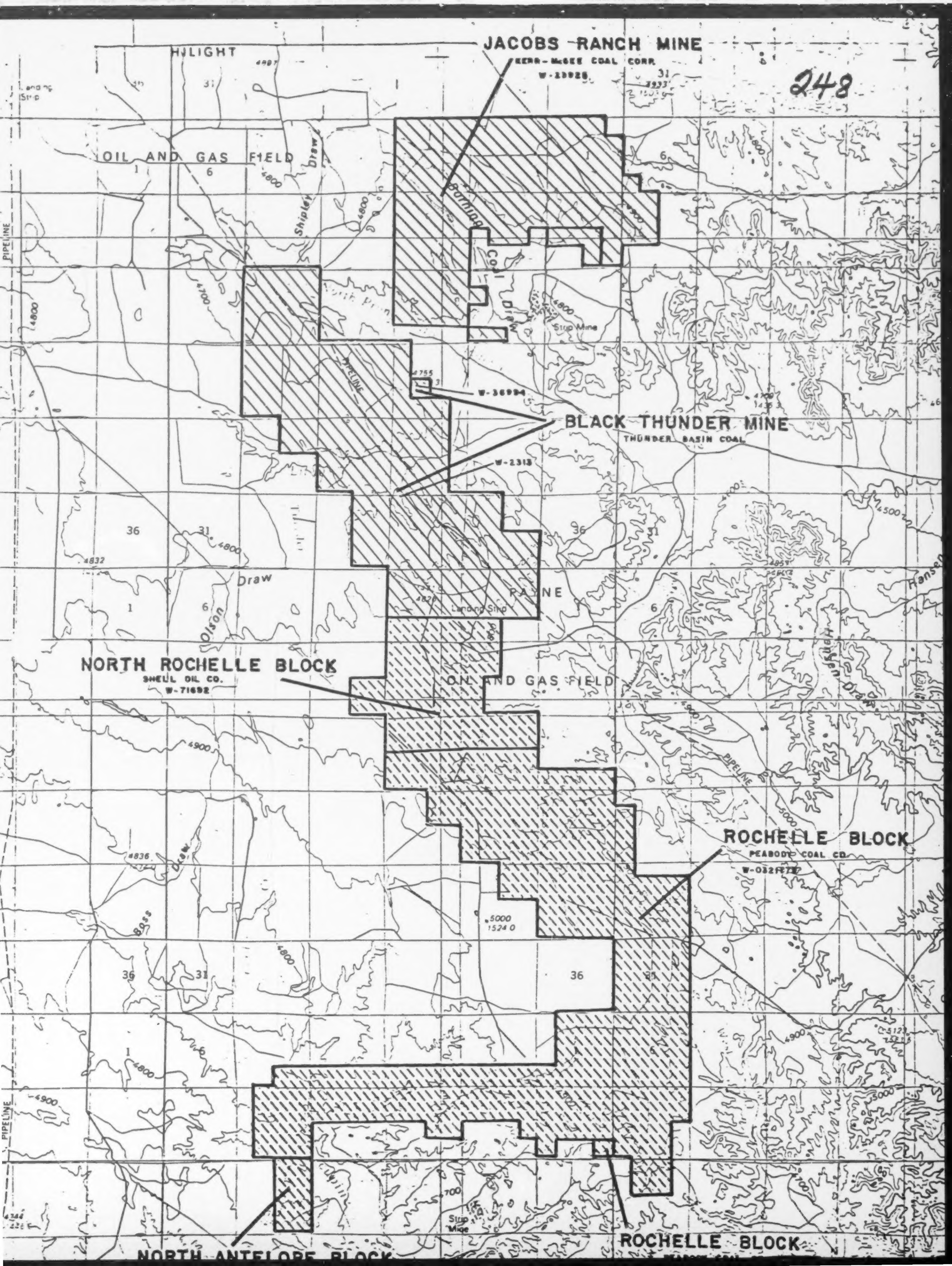
Total recoverable permitted federal in mine plan (mt): 666

Total recoverable federal in leaseblock: 666

Notes:

Potential alluvial valley floors are North Prong Little Thunder and Little Thunder Creeks. Although these valleys could not be prohibited from mining because operations begun prior to passage of PL 95-87, the company must demonstrate that reclamation will meet the standards of PL 95-87.

In 1976, USGS asked Thunder Basin to mine three coal pockets (120 acres) outside lease area. Authority not granted yet to mine this area of about 10 mt. Modification to South Pit mining approved; mining can continue until June 1982, after which updated plan must be approved.


JACOBS RANCH MINE
KERR-McGEE COAL CORP.
W-23928
HILIGHT
Landing Strip
OIL AND GAS FIELD
Shipley Draw
Burning Coal Draw
North Prong
Strip Mine
PIPELINE
W-36994
BLACK THUNDER MINE
THUNDER BASIN COAL
W-2313
PAYNE
Landing Strip
Olson Draw
NORTH ROCHELLE BLOCK
SHELL OIL CO.
W-71692
OIL AND GAS FIELD
ROCHELLE BLOCK
PEABODY COAL CO.
W-0321273
Hansen Draw
Boss Draw
Strip Mine
NORTH ANTELOPE BLOCK
ROCHELLE BLOCK
4800
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4500
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5000
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BLACK THUNDER MINE

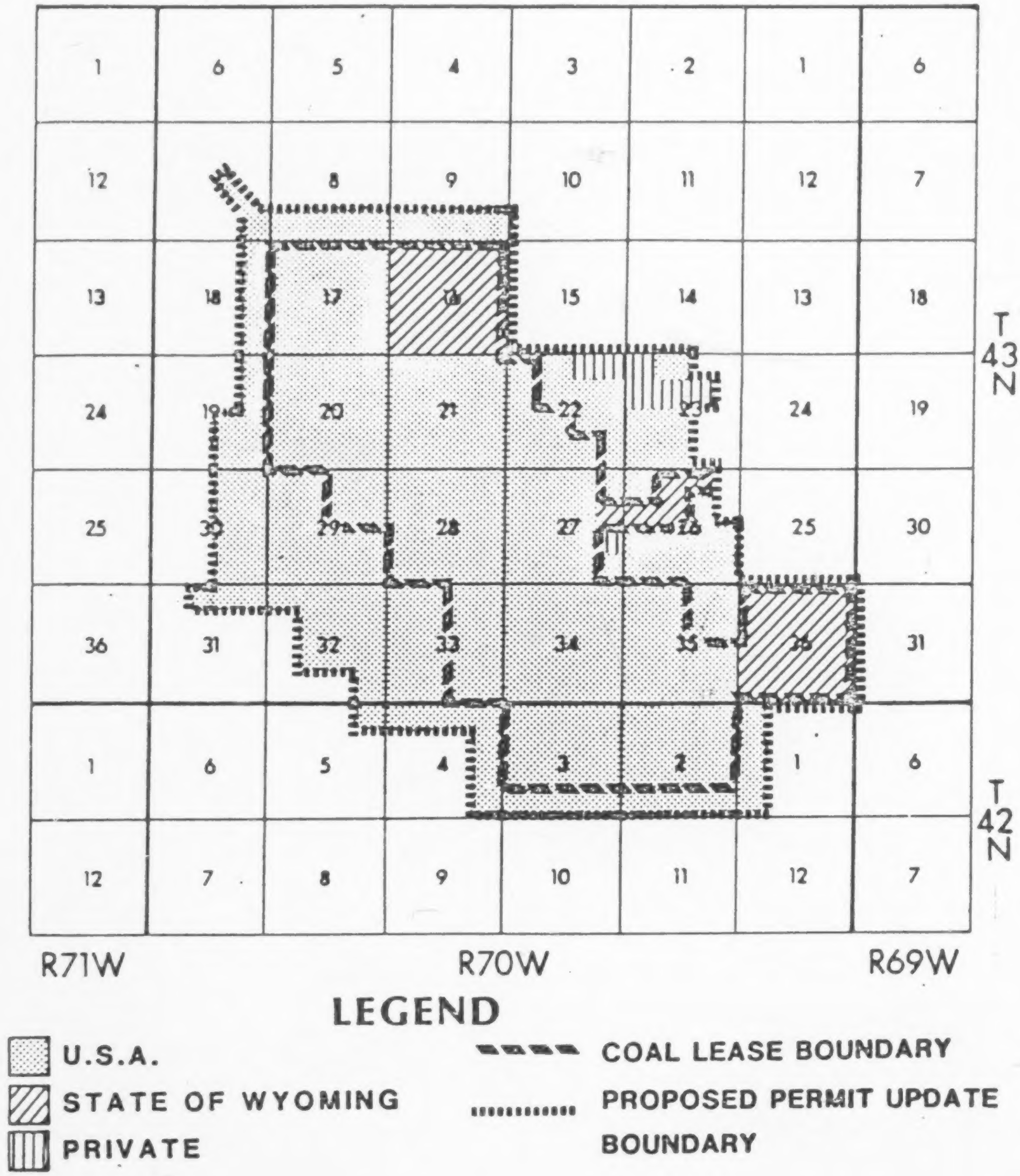
The Black Thunder Mine, operated by the Thunder Basin Coal Company, a subsidiary of the ARCO Coal Company, in turn a subsidiary of the Atlantic Richfield Company, is located in southeastern Campbell County. The first coal was shipped from the mine in 1977. The mine is located within the Thunder Basin National Grassland, managed by the U. S. Forest Service. Coal reserves in the mine plan area are primarily those of federal lease W-2313, with minor reserves in a 40-acre federal lease W-36094, and in two state coal leases. The mine is a truck/shovel operation (Fig. 1).

Alluvial valley floor studies have been prepared on the North Prong Little Thunder Creek and on Little Thunder Creek, both ephemeral streams which cross the mine permit area. Because mining began prior to passage of PL 95-87, the valleys cannot be prohibited from mining under statutory alluvial valley floor provisions; however, Thunder Basin Coal must demonstrate that reclamation of the valleys will be successful and will meet the performance standards of PL 95-87 and the Wyoming State Program.

Background

Atlantic Richfield Company began acquiring federal, state, and private coal leases in southeast Campbell County in the mid-1960s and within a few years had leased more than 7,000 acres. Drilling began in 1967. Initial sales contracts called for delivery of coal from Black Thunder beginning in late 1975, but delays associated with the Sierra Club v. Morton lawsuit and with obtaining permits delayed development of the mine.

BT-2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R69W
LEGEND
U.S.A.
STATE OF WYOMING
PRIVATE
COAL LEASE BOUNDARY
PROPOSED PERMIT UPDATE BOUNDARY

REVISIONS

R.A.C.

ENERGY GRAPHICS

L.B.

AS NOTED

JUNE, 1981

1

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N

Thunder Basin Coal Company
Black Thunder Mine Wright, Wyoming 82732

PERMIT UPDATE
Figure 1
COAL OWNERSHIP
BLACK THUNDER MINE
PERMIT AREA

A mining and reclamation plan was submitted to the U. S. Geological Survey (USGS) on September 5, 1973 and revised plans were submitted in May 1974 and to the State of Wyoming on July 1, 1974. Approval was granted by the State on December 3, 1974 and a modification was granted on December 30, 1975. Following the U. S. Supreme Court decision on the Sierra Club lawsuit in early 1976, construction began that spring.

Authorization to overstrip an area already permitted by Kerr-McGee Corporation's Jacob Ranch Mine permit was received on November 17, 1977. Permit Amendment 233-A1 was authorized January 27, 1978 for additional overstripping activities. An amendment application has been submitted which would add 4,447.68 acres to the permit area for additional mining and surface disturbance.

Physical Environment

The terrain of the Black Thunder Mine is typical of southern Campbell County. Gently rolling uplands are dissected by ephemeral stream channels such as Little Thunder and North Prong, Little Thunder Creeks. Little Thunder Creek bisects the mine property, flowing west to east, while North Prong, Little Thunder Creek crosses the northern edge of lease W-2313. These valleys are being evaluated for possible designation as alluvial valley floors. ARCO Coal (1981) maintains that the valley areas underlain by unconsolidated stream-laid deposits are very small and that the only subirrigated valley areas result from seepage from stock ponds. The State of Wyoming has given no indication of the possible status of these valleys as alluvial valley floors. About two miles east of the mine, at the confluence of North Prong and Little Thunder Creeks, a larger subirrigated area is more likely to be designated an alluvial valley floor.

There is an active golden eagle nest on the site and peregrine falcons and bald eagles also use the area for habitat at different times of the year. A black-footed ferret was sighted during construction one-half mile west of the permit area.

Coal in the mine plan area is contained in four very thin but traceable coal beds in the Wasatch formation and in four coal beds in the upper 100 feet of the Fort Union formation. The uppermost Fort Union formation coal seam, the Wyodak-Anderson seam, is the only one which is surface mineable. The three seams below the Wyodak-Anderson area are very thin. The Wyodak-Anderson seam ranges from 20 to 70 feet in thickness, and averages 66 feet.

Mining and Reclamation: Methods and Issues

The Black Thunder operation is a truck/shovel operation. Overburden is loaded by 36-cubic yard electric shovels. Benches in 50-foot lifts are excavated, and spoil is hauled to a previously mined area. Mining began in a pit on Wyoming state lease 0-26750. In 1981, mining was completed in this area and a new pit was opened on federal lease W-2313, south of the state lease. Mining at this pit is approved until 1982, after which a new mine plan must be approved. The company has been requested by the USGS to recover an additional 10 mt of coal east of the permit and lease areas. If not recovered in the course of regular Black Thunder operations, this coal will not be recovered. Mineability and marketability studies on this small tract are now underway.

As noted, ARCO may have to restore the essential hydrologic functions of North Prong and Little Thunder Creeks if the valleys are designated alluvial valley floors. A bald eagle nest will also have to relocated during mining.

REFERENCES

ARCO Coal Company. 1981. Mining and reclamation plan.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
BLACK THUNDER MINE	THUNDER BASIN COAL CO. (ATLANTIC RICHFIELD CO.)	W-2313	5844.31a[1]	43N70W17, 20-22, 27-29, 33-35 42N70W23	12/1/66	$1/a	20¢/TON	PRODUCING
		W-36094	40.0a	43N70W22	12/1/66	$1/a	20¢/TON	

[1] ARCO RESURVEY INDICATES ACTUAL AREA 5954.2a

LEASE REFERENCE INDEX

STATE: WYOMING REGION: POWDER RIVER COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
BLACK THUNDER MINE	THUNDER BASIN COAL CO.	W-2313 W-36094	7659.9a			TRUCK/ SHOVEL	PRODUCING	20.5 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

~~IN PLACE~~: MINEABLE : 760

RECOVERABLE: 709

SOURCE:

ARCO, 1981

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF WYOMING 026750 (1280a.)
STATE OF WYOMING 027137 (200a.)

All Figures Shown in Million Tons

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING   REGION: POWDER RIVER   COUNTY: CAMPBELL

MINE NAME OR LEASE BLOCK: BLACK THUNDER MINE

LESSEE(S): THUNDER BASIN COAL COMPANY

NUMBER OF LEASES: 2

DATE MINE OPENED: 1977

PROJECTED CLOSING DATE: 2016

REMAINING MINE LIFE: 35 YRS

REMAINING RECOVERABLE RESERVES:

FEDERAL: 666 MT

NON-FEDERAL: 43 MT

MINE DESIGN CAPACITY: 20.5 MTY

RECOVERY RATE: 95%

CUMULATIVE PRODUCTION TO 1979:

1979 ACTUAL PRODUCTION: 6,244,184

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	10.5	0	10.5
1981	12.5	2	12.5
1982	14.5	7	14.5
1983	15.1	15.1	15.1
1984	15.1	15.1	15.1
1985	15.5	15.5	15.5
1986	17.0	17.0	17.0
1987	18.6	18.6	17.3
1988	19.6	19.6	17.3
1989	20.5	20.5	17.3
1990	20.5	205	17.3
~~Post 1990~~ 1991-2015	20.5 MTY	20.5 MTY	17.3 MTY
2016	17.0	17.0	

NOTES:

DATA SOURCES:
GLASS, 1980
ARCO, 1981

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING　　REGION: POWDER RIVER　　COUNTY: CAMPBELL

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
BLACK THUNDER MINE	THUNDER BASIN COAL COMPANY	2	TRUCK/SHOVEL

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	TOP RIDER 3	TOP RIDER 2	WYODAK-ANDERSON					
FORMATION	WASATCH	WASATCH	FORT UNION					
RANK	—— SUBBITUMINOUS ——							
THICKNESS			66					
BTU/LB			8665					
SULFUR (%)			0.33					
ASH (%)	ALL QUALITY DATA							
MOISTURE (%)	CONFIDENTIAL							
FIXED CARBON (%)								
VOLATILE (%)								
SEAM DEPTH								
IN-PLACE RESERVES			760					
RECOVERABLE RESERVES	0	0	709					
RECOVERY RATE	0	0						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL	709	51	760	
	SURFACE	709	51	760	
	UNDERGROUND	—	—	—	
RECOVERABLE:	TOTAL	666	43	723	
	SURFACE	666	43	723	
	UNDERGROUND	—	—	—	

NOTES:

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Dave Johnston Mine

Location: Converse County, Wyoming

Lease Number(s):
C054769
W038602
W041355
W038597
W0244167
W0312918
W0136194
W0136196
W0324701
W0310712

Lessee: Pacific Power and Light Co.

Operator: Glenrock Coal Company

Proximity to Other Operations: --

First Coal Shipped: 1958

1979 Production: 3.8 mt

1980 Production: 3.8 mt

Ultimate Mine Design Capacity: 3.8 mt

Remaining Mine Life: 26+ years

Mining Method: Truck/shovel, Scraper/dozer

Recovery Rate: 95%

Permitted Mine Plan Area: 13,025.7 acres

Federal Lease Area Associated with Mine Plan: 9662 acres

Pending Actions:

Coal Data

Seam Name(s): Badger, School

Thickness (ft): 12-20 (Badger)
20-38 (School)

Rank: Subbituminous

BTU/lb: 7,669 (Badger)
8,001 (School)

Sulfur (%): 0.63 (Badger)
0.46 (School)

Overburden Thickness: 20-140 ft

Overburden/Coal Ratio: 3.03

Reserves:

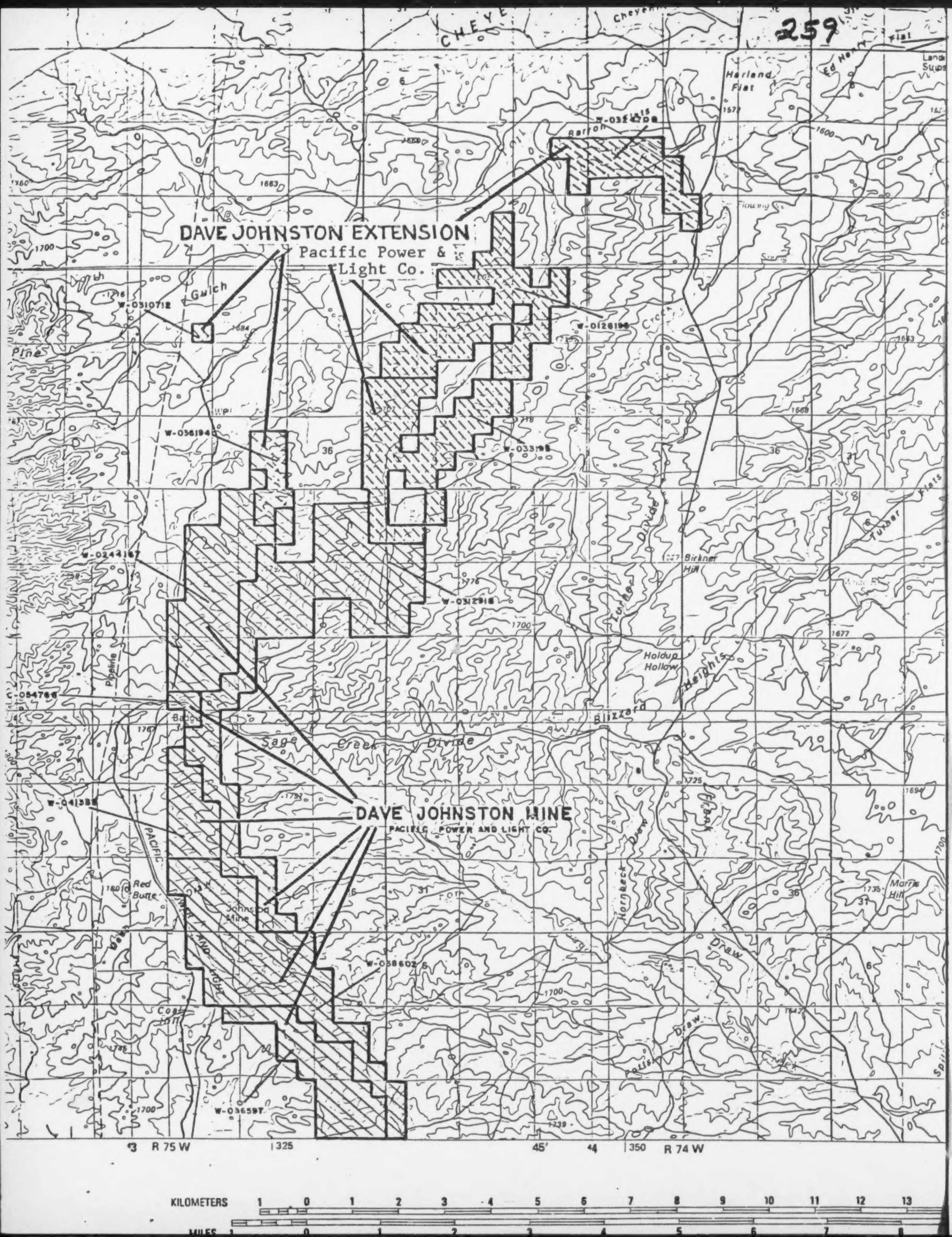
Total recoverable permitted mine plan (mt): 91.2

Total recoverable permitted federal in mine plan (mt): 68.4

Total recoverable federal in leaseblock: C

Notes:

Production is captive to the Dave Johnston Power Plant in Glenrock. NERCO has obtained five leases north of Dave Johnston previously held by SunEDCo and development of these reserves will extend life of mine from 15 to 26 years. NERCO would like to leave some highwalls to permit recovery of additional reserves pending changes in economic conditions.


DAVE JOHNSTON EXTENSION
Pacific Power & Light Co.
W-0310712
W-0126196
W-036194
W-033198
W-0244167
W-0312918
C-054766
W-041383
DAVE JOHNSTON MINE
PACIFIC POWER AND LIGHT CO.
W-038602
W-036597
Johnston Mine
Red Butte
Sage Creek Divide
Blizzard Heights
Holdup Hollow
Birkner Hill
Harland Flat
Morris Hill
Hornbeck Draw
Pine
Gulch
CHEYENNE
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R 74 W
45'
KILOMETERS
MILES

DAVE JOHNSTON MINE

The Dave Johnston Mine occupies an area exceeding 20 square miles of Converse County, Wyoming, 13 miles northeast of Glenrock. The mine is operated by Glenrock Coal Company, a subsidiary of NERCO, in turn a subsidiary of Pacific Power and Light Company (PPL). All production at the mine is shipped by rail to the Dave Johnston Power Plant in Glenrock. Six federal coal leases, the earliest obtained in 1933, are being developed along with two Wyoming state coal leases. The federal leases underlie about 75% of the permit area and account for over 85% of the mine plan recoverable reserves. In the next decade, all mined reserves will be federal.

Reserves at the presently permitted mine will be exhausted in 1996, unless the existing maximum economic overburden stripping limit is deepened. Because the Dave Johnston Power Plant is scheduled to continue operation well beyond 2000, NERCO has obtained additional reserves in the mine area. NERCO obtained five federal coal leases adjacent and to the north of the mine from Sunoco Energy Development Company in 1981. These reserves are expected to prolong the life of the mine until 2007.

The Dave Johnston Mine was an early leader in Wyoming reclamation. NERCO reclaimed areas in the early 1970s even though the company was not legally required to do so. However, after implementation of the Surface Mining Act in 1979, Dave Johnston received five violations during a one-year period. These violations included the burial of topsoil and off-site sedimentation problems. Despite these initial compliance problems, reclamation at Dave Johnston is considered generally successful, and the company is considered very conscientious. (Matheson, 1980) An important unresolved major issue concerns the company's potential plan to defer highwall reclamation activities on one seam for more than two years. The unreclaimed highwalls would extend for several miles. At present, unreclaimed disturbed land stretches for five miles along the coal outcrop, and the Wyoming Department of Environmental Quality is pressing for timely reclamation of these areas. The company would like to defer reclamation in hopes of recovering more coal at a later date. It is uncertain whether a deferred type of mining and reclamation plan will be approved under the Wyoming permanent program.

Existing Environment

Geographically, the Dave Johnston coal field straddles the Sage Creek divide, a broad east-west ridge separating tributaries of the North Platte and Cheyenne Rivers. The Dave Johnston leases follow the trend of a local north-south ridge known as Ridge Road Divide. Relief in the area is minimal with elevations ranging from 5,400 to 6,053 feet above sea level. Shallow valleys and rolling hills characterize the area. All streams within the permit area are ephemeral. The area is used by bald eagles in the winter.

Geologically, the Dave Johnston Mine is located at the southern end of the Powder River coal basin. The two coal seams mined at Dave Johnston, the Badger and the School, are within the lowest portion of the Eocene age Wasatch formation. The Badger seam ranges from 12 to 20 feet in thickness while the School seam ranges from 20 to 38 feet in thickness. Interburden between the seams ranges from 110 to 180 feet in thickness. There is a two-foot thick rider seam between the School and Badger seams.

The company states that the rider is not of mineable quality because it cannot be blended with the other two seams and the heating value is less than 6,000 BTU.

Overburden and interburden are dominantly composed of sandstones, interbedded with siltstones, claystones, and shale. Some characteristics of overburden and interburden pose problems. About 13% of cored overburden samples in permitted mining areas have equivalent soil textures of clay or silty clay. More than half of the cored overburden samples have acidic horizons, with pH values as low as 3.5. One core hole sampled had high concentrations of boron. However, 94.3% of the Badger seam overburden and 66.7% of School seam overburden are suitable as spoil material. (NERCO, 1981)

Mining and Reclamation: Methods and Issues

Glenrock Coal utilized conventional earth-moving scrapers and dozers when mining first began in 1958. At that time, mining focused solely on recovery of the School coal seam. During the early years of the mine, all boxcuts were created by scrapers. In early 1972, a Page 752 dragline, which is still the prime overburden removal machine, replaced the scraper operation. In 1979, a fleet of contracted scrapers was added to assist the dragline.

Although two coal seams are mined at Dave Johnston, each is mined separately, and mine cuts do not overlap. The dragline excavates one series of cuts on the School seam followed by a series on the Badger seam in a stair-step pattern. This sequence is alternated for an average of three cuts until the existing economical stripping limit of 5:1 is reached. Mining shifts throughout the north/south elongated mine plan area.

The dragline functions in a conventional single seam, side-cast operation. Scrapers flatten the original topography so that the dragline can operate efficiently and safely. Where overburden exceeds 60 feet, a modified extended bench mining technique is utilized. Mine pits trend along the northwesterly strike of the coal seams with the initial cuts beginning at the 20-foot cover line. Boxcut spoils are placed beyond the coal subcrop. Where scrapers open boxcuts, spoil is either placed beyond the coal outcrop or hauled directly to mined-out pits. The process of alternating cuts, from School to Badger seam, allows Glenrock Coal to balance overall stripping ratios.

As noted earlier, mining progresses north and south along the strike of the coal beds. The dragline follows the strike along a zone of uniform overburden depth. Later, the dragline returns to previously mined areas to recover coal under greater overburden depths. It is advantageous for Glenrock Coal to mine long north/south passes, of uniform overburden depth. However, this method necessitates leaving highwalls and unreclaimed land awaiting return of the dragline. As noted above, NERCO may propose to leave the Badger seam highwall open for more than two years, increasing the chance of recovery of additional reserves, should economic conditions change.

Approximate original contour will be difficult to achieve in mining areas completed prior to passage of PL 95-87. In these areas, boxcut spoils have already been topsoiled and reseeded. Because boxcut spoils have already been reclaimed, sufficient overburden may not be available to return final cuts to original ground surface levels. Approximate original contour can be achieved in areas of new mining, however. (NERCO, 1981)

Presently, no selective burial of topsoil is required at Dave Johnston. However, burial may be required in areas of new mining. Such a requirement, which awaits regulatory review of overburden core data, might significantly increase the cost of mining. (NERCO, 1981)

REFERENCES

NERCO. 1981. Dave Johnston Mine base document.

Matheson, Becky. 1980. Personal communication: Cheyenne, Wyoming Department of Environmental Quality district engineer, telephone interview, November 6.

STATE: WYOMING REGION: POWDER RIVER COUNTY: CONVERSE

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS. *	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
DAVE JOHNSTON MINE	PACIFIC POWER AND LIGHT CO.	C-054769	120	36N75W15,22	5/31/33 READY 5/31/78	$3/a	12½ %	
		W-038602	2060.11	35N75W2, 3 36N75W21, 28, 33, 34, 35	6/1/56 READY 6/1/78	$3/a	12½%	
		W-041355	560	36N75W22, 27	7/2/56 READY 7/2/78	$3/a	12½%	
		W-038597	1400	35N75W10, 11, 12, 13, 24	8/1/58	$1/a	15¢/TON	PRODUCING
		W-0244167	1882.71	36N75W2, 3, 10, 11, 15, 21, 22 37N75W35	6/1/63	$1/a	15¢/TON	
		W-0312918	3779.33	35N74W18, 19 35N75W1, 2, 11, 12, 13 36N74W6, 7 36N75W1, 2, 11, 12, 14, 15, 22, 27, 34, 35	6/1/65	$1/a	20¢/TON	

* 5 additional leases have been obtained from SunEDCo, and will eventually be added to mine plan, reserves of these leases not Known

STATE: WYOMING REGION: POWDER RIVER COUNTY: CONVERSE

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
DAVE JOHNSTON MINE	PACIFIC POWER AND LIGHT CO.	C-054769 W-038602 W-041355 W-038579 W-0244167 W-031218	13025.71a			DRAGLINE, SCRAPER, TRUCK/SHOVEL	PRODUCING	3.8 MTY

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE:

RECOVERABLE: 91.2

SOURCE: NERCO, 1981

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

STATE OF WYOMING 0-20143 (1280a)
0-20144 (1280a)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WYOMING REGION: POWDER RIVER COUNTY: CONVERSE

MINE NAME OR LEASE BLOCK: DAVE JOHNSTON MINE

LESSEE(S): PACIFIC POWER & LIGHT CO.

NUMBER OF LEASES: 6

DATE MINE OPENED: 1958

PROJECTED CLOSING DATE: 2007

REMAINING MINE LIFE: 26 YRS +

REMAINING RECOVERABLE RESERVES:

FEDERAL: 68.4 MT

NON-FEDERAL: 22.8 MT

MINE DESIGN CAPACITY: 3.8 MTY

RECOVERY RATE: 95%

CUMULATIVE PRODUCTION TO 1979: —

1979 ACTUAL PRODUCTION: 3.8

MINE PLAN PROJECTED PRODUCTION BY YEAR	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION	
1980	3.8	3.8	3.8	ALL PRODUCTION
1981	3.8	3.8	3.8	COMMITTED TO
1982	3.8	3.8	3.8	DAVE JOHNSTON
1983	3.7	3.7	3.7	POWER PLANT
1984	3.7	3.7	3.7	
1985	3.7	3.7	3.7	
1986	3.7	3.7	3.7	
1987	3.7	3.7	3.7	
1988	3.7	3.7	3.7	
1989	3.7	3.7	3.7	
1990	3.7	3.7	3.7	
Post 1990	3.7 MTY	3.7 MTY (1991-2007)	3.7	

NOTES:

DATA SOURCES:

NERCO, 1981

GLASS, 1980

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WYOMING   REGION: POWDER RIVER   COUNTY: CONVERSE

MINE NAME (OR LEASE BLOCK):	~~LESSEE(S)~~ (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
DALE JOHNSTON MINE	GLENROCK COAL CO.	6	DRAGLINE, SCRAPER

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	BADGER	SCHOOL						
FORMATION	WASATCH							
RANK	SUBBITUMINOUS C							
THICKNESS	12-20	20-38						
BTU/LB	7669	8001						
SULFUR (%)	0.63	0.46						
ASH (%)	8.82	8.02						
MOISTURE (%)	28.41	26.63						
FIXED CARBON (%)	30.26	32.71						
VOLATILE (%)	31.69	32.77						
SEAM DEPTH	20-80	20-145						
IN-PLACE RESERVES								
RECOVERABLE RESERVES	13.2	55.4						
RECOVERY RATE	95%	95%						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	68.4	22.8	91.2	
	SURFACE	68.4	22.8	91.2	
	UNDERGROUND	0	0	0	

NOTES:

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

CHAPTER V

SUMMARIES OF SELECTED UNDEVELOPED FEDERAL LEASEBLOCKS

Mine Name: Wolf Mountain

Lease Number(s): M061686

Location: Big Horn County, Montana

Lessee: Rosebud Coal Sales Co.
(Peter Kiewit Sons' Co.)

Operator: Rosebud Coal Sales Co.

Proximity to Other Operations: Adjacent to proposed CX Ranch Mine on south; three miles southwest of West Decker Mine

First Coal Shipped: 1985?

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 4 mty

Remaining Mine Life: --

Mining Method: --

Recovery Rate: --

Permitted Mine Plan Area: --

Federal Lease Area Associated with Mine Plan: 524 acres

Pending Actions: Permit application expected Spring 1982

Coal Data

Seam Name(s): --

Overburden Thickness: --

Thickness (ft): --

Overburden/Coal Ratio: --

Rank: --

Reserves:

BTU/lb: --

Total recoverable permitted mine plan (mt): --

Sulfur (%): --

Total recoverable permitted federal in mine plan (mt): --

Total recoverable federal in leaseblock: --

Notes:

Mine Name: CX Ranch

Lease Number(s): M46292

Location: Big Horn County, Montana

Lessee: Consolidation Coal Co./ Standard of
(DuPont Co.) California

Operator: Consolidation Coal Co.

Proximity to Other Operations: Adjacent to proposed Wolf Mountain Mine on north; four miles southwest of West Decker Mine; five miles south of Spring Creek Mine

First Coal Shipped: 1985

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 8 mty

Remaining Mine Life: 9 years

Mining Method: Truck/shovel

Recovery Rate: ——

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: 674 acres

Pending Actions: Application submitted, regulatory decision expected 1982; proposed permit area 1905 acres

---

Coal Data

Seam Name(s): Anderson/Dietz, Canyon

Overburden Thickness: 50-300 feet

Thickness (ft): 80 (Anderson/Dietz)
21 (Canyon)

Overburden/Coal Ratio: --

Rank: Subbituminous

Reserves:

BTU/lb: 12402* (Anderson/Dietz)
12510* (Canyon)

Total recoverable permitted mine plan (mt): 46.9

Sulfur (%): 0.38* (Anderson/Dietz)
0.43* (Canyon)

Total recoverable permitted federal in mine plan (mt): NA

*Dry basis

Total recoverable federal in leaseblock: NA

Notes:

The Montana regulatory authority has designated Squirrel Creek, which crosses a portion of the mine plan, as an alluvial valley floor, significant to farming, and prohibited from mining. The mine plan developed to avoid this valley has a small reserve, and the companies reportedly anticipate leasing additional reserves around the proposed mine to extend mine life.

STATE: Montana REGION: Powder River COUNTY: Big Horn

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
C X Ranch	Consolidation Coal	M 46292	674		3/1/64			proposed

LEASE REFERENCE INDEX

STATE: Montana REGION: Powder River COUNTY: Big Horn

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL(PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
CX Ranch	Consolidation Coal	M 46272	1905a proposed	—	—	truck/ shovel	proposed	8 mty

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: —

RECOVERABLE: 46.9

SOURCE:

ASSOCIATED LEASES WITH REASONS WHY:

All Figures Shown in Million Tons

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Montana REGION: Powder River COUNTY: Big Horn

MINE NAME OR LEASE BLOCK C X Ranch	LESSEE(S) Consolidation Coal	NUMBER OF LEASES 1	DATE MINE OPENED: 1985 PROJECTED CLOSING DATE: 1991 REMAINING MINE LIFE: 7yrs.
REMAINING RECOVERABLE RESERVES: FEDERAL: } 46.9mt NON-FEDERAL:		MINE DESIGN CAPACITY 8mty RECOVERY RATE: —	CUMULATIVE PRODUCTION TO 1979: — 1979 ACTUAL PRODUCTION: —

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	0		0
1981	0		0
1982	0		0
1983	0		0
1984	0		0
1985	3		0
1986	5		0
1987	7		0
1988	8		0
1989	8		0
1990	8		0
~~Post 1990~~ 1991	8		0

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

274

STATE: Montana

REGION: Powder River

COUNTY: Big Horn

MINE NAME (OR LEASE BLOCK):	LESSEE(S) (OR OPERATOR):	NUMBER OF LEASES IN BLOCK OR PLAN:	MINING METHOD:
C X Ranch	Consolidation Coal	1	truck/shovel

COAL CHARACTERISTICS:		SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME		Anderson/Dietz	Canyon						
FORMATION		Fort Union							
RANK		subbituminous							
THICKNESS		80	21						
BTU/LB	dry	12402	12510						
SULFUR (%)	dry	0.38	0.43						
ASH (%)	dry	5.06	4.54						
MOISTURE (%)		21.19	21.06						
FIXED CARBON (%)	dry	52.21	55.42						
VOLATILE (%)	dry	42.73	40.05						
SEAM DEPTH									
IN-PLACE RESERVES									
RECOVERABLE RESERVES									
RECOVERY RATE									

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL			46.9	
	SURFACE	9			
	UNDERGROUND				

NOTES:

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: South Rawhide

Location: Campbell County, Wyoming

Lease Number(s): W5035

Lessee: Exxon Coal USA

Operator: Carter Mining Company

Proximity to Other Operations: Adjacent to Eagle Butte on north, East Gillette on east

First Coal Shipped: 1984 (company proposes)

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 7 mty

Remaining Mine Life: 36 years

Mining Method: Truck/shovel

Recovery Rate: 70%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: 4782 acres

Pending Actions: Mine plan submitted 12/80; lease exchange proposal filed with BLM to decrease in-place reserves by 398.2 mt; proposed permit area 2680 acres.

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 90

Rank: Subbituminous

BTU/lb: 7970

Sulfur (%): 0.38

Overburden Thickness: 90 feet

Overburden/Coal Ratio:

Reserves:

Total recoverable permitted mine plan (mt): 195.4

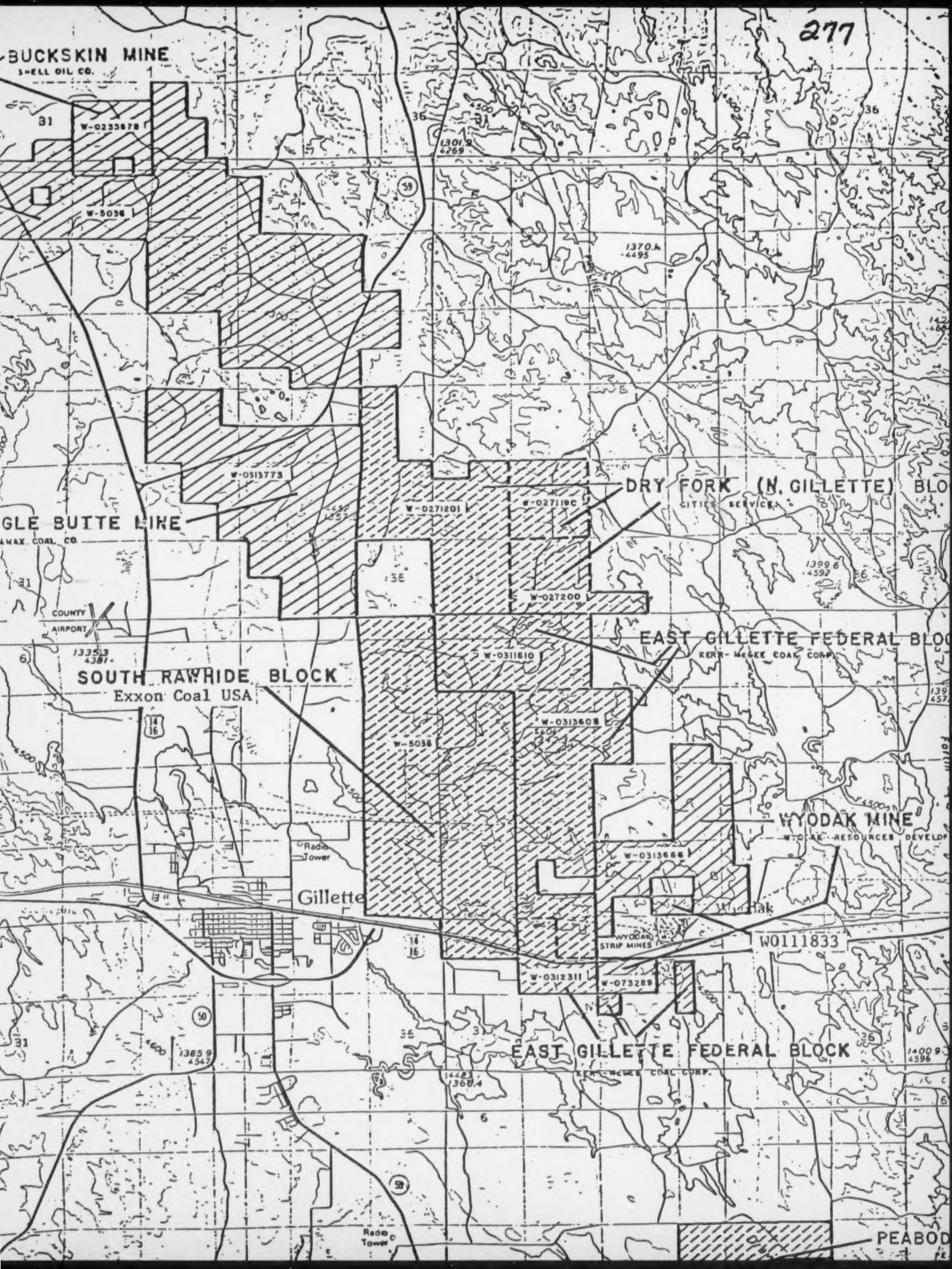
Total recoverable permitted federal in mine plan (mt): 195.4

Total recoverable federal in leaseblock: 537.0

Notes:

Exxon Coal USA has proposed a lease exchange to decrease federal lease in-place reserves by 398.2 mt. The proposed areas are near and adjacent to the town of Gillette.

No contracts have been obtained for the proposed mine reserves and a 1984 opening is doubtful.


BUCKSKIN MINE
SHELL OIL CO.
W-0233878
W-5036
W-0313773
GLE BUTTE MINE
ANAX COAL CO.
COUNTY AIRPORT
1335.3
4381
SOUTH RAWHIDE BLOCK
Exxon Coal USA
1301.2
4269
1370.4
4495
PIPE LINE
W-0271201
W-027119C
W-027200
DRY FORK (N. GILLETTE) BLO
CITIES SERVICE
1399.6
4592
EAST GILLETTE FEDERAL BLO
KERR-McGEE COAL CORP.
W-0311810
W-0313608
W-5036
W-0313666
WYODAK MINE
WYODAK RESOURCES DEVELOP
Radio Tower
Gillette
Wyodak
WYODAK STRIP MINES
W0111833
W-0312311
W-073289
EAST GILLETTE FEDERAL BLOCK
KERR-McGEE COAL CORP.
1385.9
4547
1400.9
4596
1368.4
Radio Tower
PEABOD
59
50
14
16
4500
4600
31
36
6

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
South Rowhide	Exxon Coal USA	W5035	4782		12/1/67			proposed

LEASE REFERENCE INDEX

STATE: Wyoming REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL(PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
South Rawhide	Exxon Coal USA	W5035	2680 a (proposed)			truck/ shovel	proposed	7 mty

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE: 278.1

RECOVERABLE: 195.4

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Wyoming **REGION:** Powder River **COUNTY:**

MINE NAME OR LEASE BLOCK South Rawhide	LESSEE(S) Exxon Coal USA	NUMBER OF LEASES 1	DATE MINE OPENED: 1984 PROJECTED CLOSING DATE: 2020 REMAINING MINE LIFE: ~~2010~~ 36 years
REMAINING RECOVERABLE RESERVES: FEDERAL: 1954 NON-FEDERAL: 0		MINE DESIGN CAPACITY 7mty RECOVERY RATE: 70%	CUMULATIVE PRODUCTION TO 1979: 0 1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980			
1981			
1982			
1983			
1984	2	2	0
1985	4	4	
1986	5	5	
1987	5	5	
1988	5	5	
1989	5	5	
1990	5	5	
~~Post 1990~~ 1991-2010	5	5	
NOTES: 2011-2019	7	7	
2020	1.4	1.4	

All Figures Shown in Million Tons

PRODUCTION SUMMARY

280

STATE: Wyoming
REGION: Powder River
COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): South Rawhide

LESSEE(S) (OR OPERATOR): Exxon Coal USA

NUMBER OF LEASES IN BLOCK OR PLAN: 1

MINING METHOD: truck/shovel

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Wyodak							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	90							
BTU/LB	7970							
SULFUR (%)	0.38							
ASH (%)	5.96							
MOISTURE (%)	32.0							
FIXED CARBON (%)	31.97							
VOLATILE (%)	30.05							
SEAM DEPTH								
IN-PLACE RESERVES	278.1							
RECOVERABLE RESERVES	195.4							
RECOVERY RATE	70%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE	278.1	0	278.1	
	UNDERGROUND				
RECOVERABLE:	TOTAL				
	SURFACE	195.4*	0	195.4*	
	UNDERGROUND				

NOTES:

* W5035 reserves are 676.3 mt (in-place), 537.0 (recoverable), Exxon Coal has proposed lease exchange to decrease in place reserves by 398.2 mt

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: East Gillette Federal Mine

Lease Number(s): W0312311
W0313668
W0311810

Location: Campbell County, Wyoming

Lessee: Kerr-McGee Coal

Operator: Kerr-McGee Coal

Proximity to Other Operations: Adjacent to Wyodak Mine, Dry Fork and South Rawhide leaseblocks

First Coal Shipped: 1984 (company proposes)

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 12.3 mty

Remaining Mine Life: 25 years

Mining Method: Truck/shovel

Recovery Rate: 90%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: 4343 acres

Pending Actions: Permit application submitted August 1981, proposed permit area 3246.1 acres

---

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 60.1-98.3

Rank: Subbituminous

BTU/lb: 8000

Sulfur (%): 0.46

Overburden Thickness: 139 feet

Overburden/Coal Ratio: --

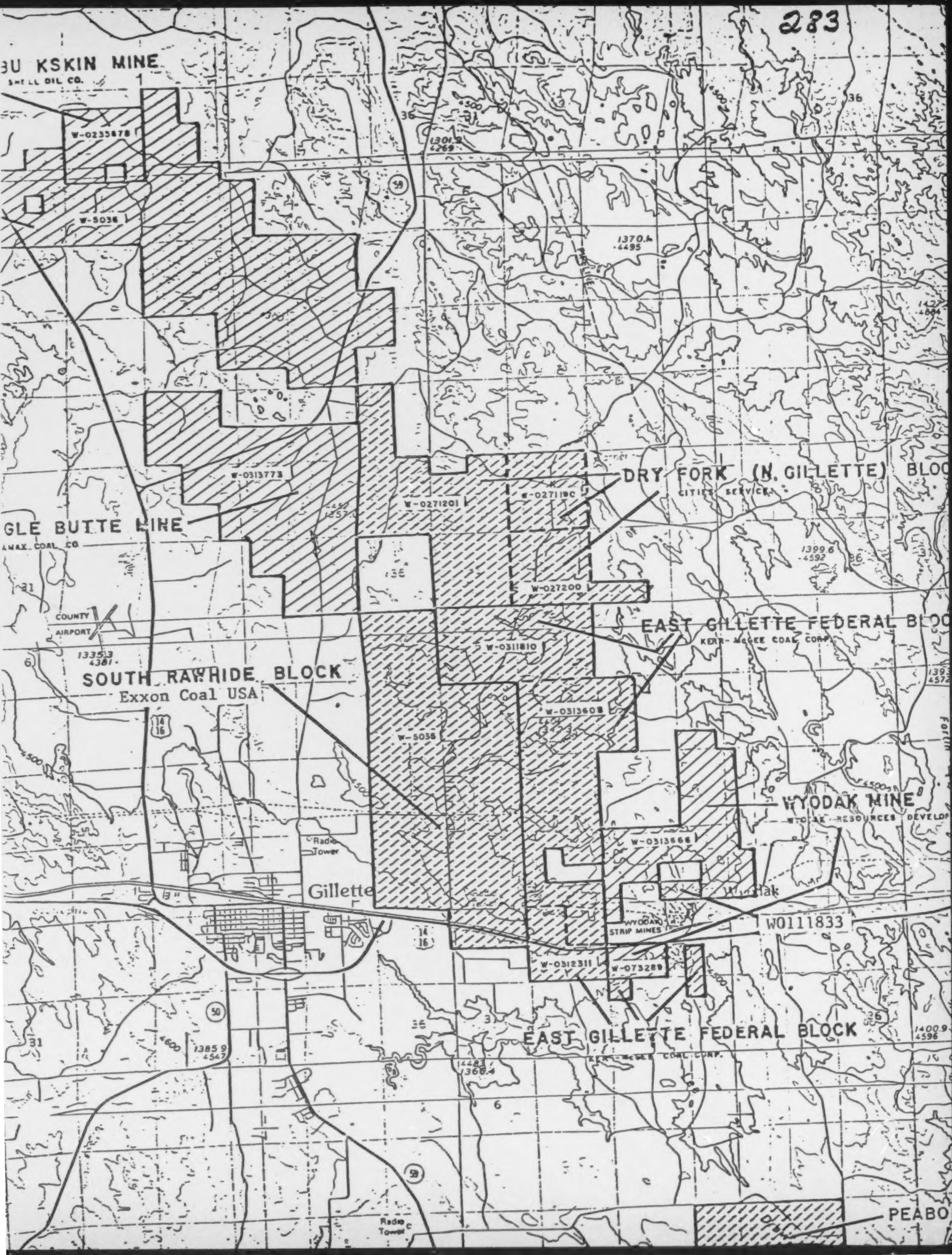
Reserves:

Total recoverable permitted mine plan (mt): 255.7

Total recoverable permitted federal in mine plan (mt): 255.7

Total recoverable federal in leaseblock: 255.7

Notes:


BU KSKIN MINE
SHELL OIL CO.
W-0233878
W-5036
W-0313773
GLE BUTTE MINE
AMAX COAL CO
COUNTY AIRPORT
1335.3
4381
SOUTH RAWHIDE BLOCK
Exxon Coal USA
14
16
59
1301.2
4269
1370.4
4495
1427
4684
DRY FORK (N. GILLETTE) BLOC
CITIES SERVICE
W-0271201
W-027119C
W-027200
1399.6
4592
EAST GILLETTE FEDERAL BLO
KERR-McGEE COAL CORP.
W-0311810
W-0313608
W-5036
1393
4572
WYODAK MINE
WYODAK RESOURCES DEVELOP
W-0313666
Radio Tower
Gillette
Wyodak
WYODAK STRIP MINES
W0111833
W-0312311
W-073289
EAST GILLETTE FEDERAL BLOCK
KERR-McGEE COAL CORP.
1385.9
4547
4483
1366.4
1400.9
4596
Radio Tower
PEABO
36
31
6
35

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
East Gillette	Kerr McGee Coal	W0312311	880		7/1/1965			proposed
		W0313668	2200		10/1/1965			
		W0311810	1263		1/1/1970			

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
East Gillette Federal	Kerr McGee Coal	W0312311 W0313668 W0311810	3246.1a (proposed)			truck/shovel	proposed	12.3 mt/y

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE:

RECOVERABLE:

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Wyoming　**REGION:** Powder River　**COUNTY:** Campbell

MINE NAME OR LEASE BLOCK	LESSEE(S)	NUMBER OF LEASES	
East Gillette Federal	Kerr McGee Coal	3	DATE MINE OPENED: 1984 PROJECTED CLOSING DATE: 2008 REMAINING MINE LIFE: 25 yrs

REMAINING RECOVERABLE RESERVES:
FEDERAL: 255.7
NON-FEDERAL: 0

MINE DESIGN CAPACITY 12.3 mty
RECOVERY RATE: 90%

CUMULATIVE PRODUCTION TO 1979: —
1979 ACTUAL PRODUCTION: —

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980			
1981			
1982			
1983			
1984	4	4	0
1985	6	6	
1986	11	11	
1987	11	11	
1988	10.9	10.9	
1989	11	11	
1990	11	11	
~~Post 1990~~ 1991-2007	10.1-12.3	10.1-12.3	
NOTES: 2008	3.2	3.2	

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Wyoming REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): East Gillette Federal

LESSEE(S) (OR OPERATOR): Kerr McGee Coal

NUMBER OF LEASES IN BLOCK OR PLAN: 3

MINING METHOD: truck/shovel

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Wyodak							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	60.1-98.3							
BTU/LB	8000							
SULFUR (%)	0.46							
ASH (%)	6.3							
MOISTURE (%)	31.5							
FIXED CARBON (%)	31.3							
VOLATILE (%)	30.8							
SEAM DEPTH	139 (avg.)							
IN-PLACE RESERVES	284.1							
RECOVERABLE RESERVES	255.7							
RECOVERY RATE	90%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE	284.1	0	284.1	
	UNDERGROUND				
RECOVERABLE:	TOTAL				
	SURFACE	255.7	0	255.7	
	UNDERGROUND				

NOTES:

287

All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: North Rochelle Mine

Lease Number(s): W71692

Location: Campbell County, Wyoming

Lessee: Shell Oil

Operator: Shell Oil

Proximity to Other Operations: Adjacent to Rochelle Mine on south

First Coal Shipped: 1985

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 8 mty

Remaining Mine Life: 26 years

Mining Method: Truck/shovel, dragline

Recovery Rate: 95%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: 1960 acres

Pending Actions: Mine plan submitted July 1981, proposed permit area 4586.9 acres

---

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 50-70

Rank: Subbituminous

BTU/lb: 8500

Sulfur (%): 0.2

Overburden Thickness: 110 feet

Overburden/Coal Ratio: —

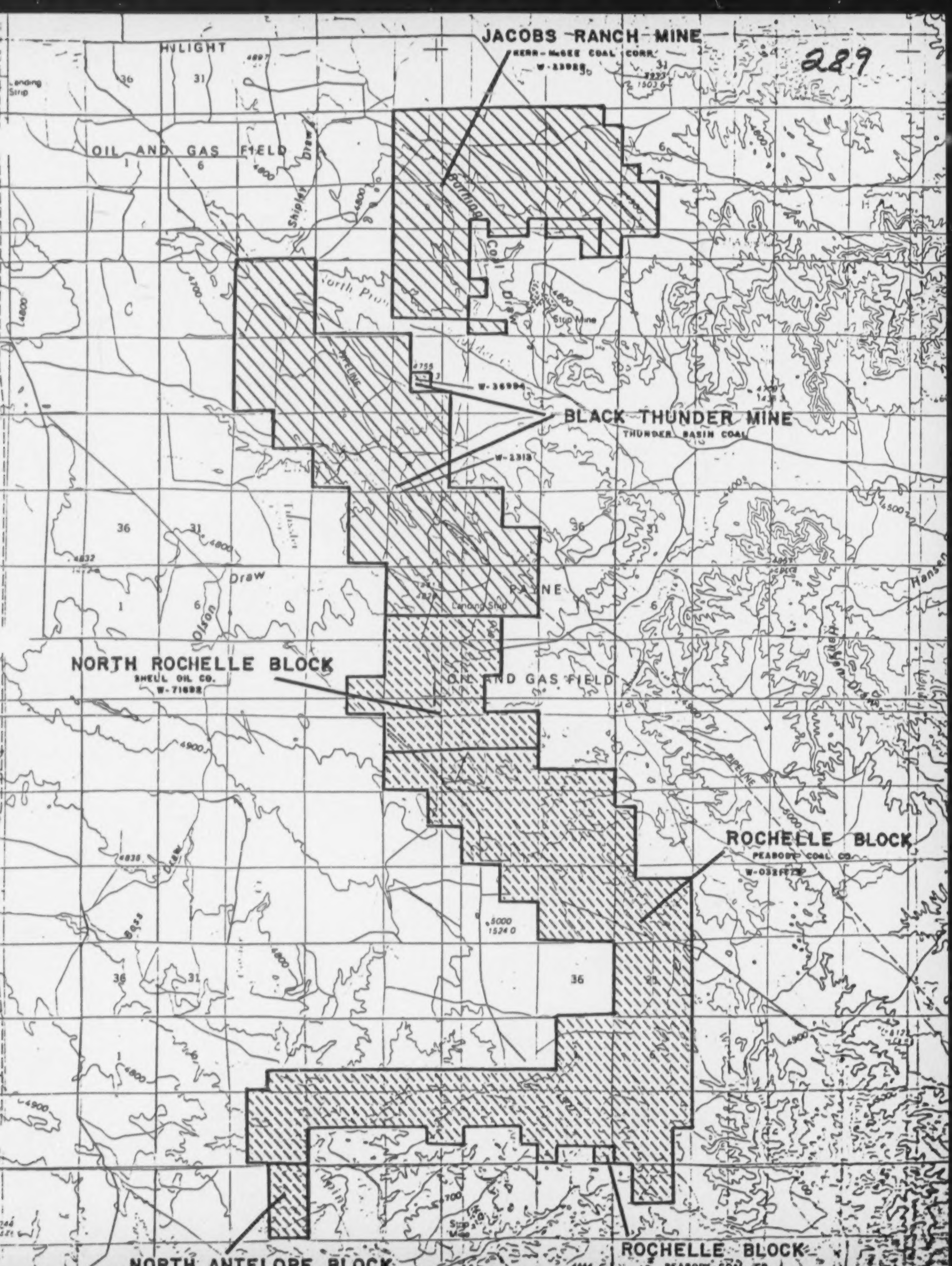
Reserves:

Total recoverable permitted mine plan (mt): 197

Total recoverable permitted federal in mine plan (mt): 196.6

Total recoverable federal in leaseblock: 196.6

Notes:


JACOBS RANCH MINE
KERR-McGEE COAL CORP.
W-23928
HILIGHT
OIL AND GAS FIELD
Lending Strip
Shipley Draw
Coal Draw
Strip Mine
North Prong
PIPELINE
4755
W-36994
BLACK THUNDER MINE
THUNDER BASIN COAL
W-2313
Olson Draw
PAYNE
Landing Strip
NORTH ROCHELLE BLOCK
SHELL OIL CO.
W-71692
OIL AND GAS FIELD
Hansen
Draw
ROCHELLE BLOCK
PEABODY COAL CO.
W-0321??
Bass Draw
5000
1524.0
NORTH ANTELOPE BLOCK
ROCHELLE BLOCK
PEABODY COAL CO.
Strip Mine
4800
4900
5000
36
31
1
6

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
North Rochelle	Shell Oil	W-71692*	1960	T42 N R70 W Sec. (2, 3, 9 10, 11, 14 15	1966		$0.20/ton	Proposal

*Reassigned from lease W-0321779, originally issue

LEASE REFERENCE INDEX

in 1964.

STATE: WY REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
North Rochelle	Shell Oil	W-71692	4,586.9 proposed	1960a.	2626.9 (80-State)	truck/ shovel/ dragline	proposed	8 m.t/y

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE: 207.6 m.t.

RECOVERABLE: 197 m.t.

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Wyoming REGION: Powder River COUNTY: Campbell

MINE NAME OR LEASE BLOCK: North Rochelle

LESSEE(S): Shell Oil

NUMBER OF LEASES: 1

DATE MINE OPENED: Proposed 1983

PROJECTED CLOSING DATE: 2012

REMAINING MINE LIFE: 26

REMAINING RECOVERABLE RESERVES: ~~197.0 m.t.~~

FEDERAL: 196.6

NON-FEDERAL: 0.4

MINE DESIGN CAPACITY: 8 m.t/y

RECOVERY RATE: 95%

CUMULATIVE PRODUCTION TO 1979: 0

1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980			
1981			
1982			
1983			
1984			
1985	2	2	2
1986	5.	5	5
1987	8.	8	5
1988	8	8	5
1989	8	8	5
1990	8	8	5
~~Post 1990~~ 1991-2010	8	8	5

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Wyoming REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): North Rochelle

LESSEE(S) (OR OPERATOR): ~~subbituminous~~

NUMBER OF LEASES IN BLOCK OR PLAN:

MINING METHOD: truck/shovel dragline

(lower) (upper) - stringers (above these)

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Canyon	Anderson						
FORMATION	Fort Union formation							
RANK			subbituminous					
THICKNESS	50-70'	<—— <1->8'						
BTU/LB	8500							
SULFUR (%)	.2							
ASH (%)	5.4							
MOISTURE (%)	28							
FIXED CARBON (%)	—							
VOLATILE (%)	—							
SEAM DEPTH	110'	3-10' above Canyon						
IN-PLACE RESERVES	207.4							
RECOVERABLE RESERVES	197							
RECOVERY RATE	95%							

MINE PLAN OR [✓ LEASE] BLOCK RESERVES Avg. overburden FEDERAL <—— mined in northern section - 5' thick NON-FEDERAL TOTAL SOURCE

IN-PLACE: TOTAL 207.2 m.t. 207'

SURFACE

UNDERGROUND

RECOVERABLE: TOTAL 197 m.t.

SURFACE

UNDERGROUND

NOTES:

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Rochelle Mine

Location: Campbell County, Wyoming

Lease Number(s): W37829
W0321779

Lessee: Peabody Coal

Operator: Rochelle Coal
(Peabody and Panhandle Eastern)

Proximity to Other Operations: Adjacent to North Rochelle Mine on north, and North Antelope Mine on southwest

First Coal Shipped: ?

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 11 mty

Remaining Mine Life: 38 years

Mining Method: Truck/shovel, dragline

Recovery Rate: 83%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan:

Pending Actions: Company submitted a "developing mine plan" April 1981, formal mine plan submitted, October 1981; proposed permit area 6858.5 acres

---

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 62.7

Rank: Subbituminous

BTU/lb: 8520

Sulfur (%): 0.2

Overburden Thickness: 134 feet

Overburden/Coal Ratio: 2.2

Reserves:

Total recoverable permitted mine plan (mt): 411.5

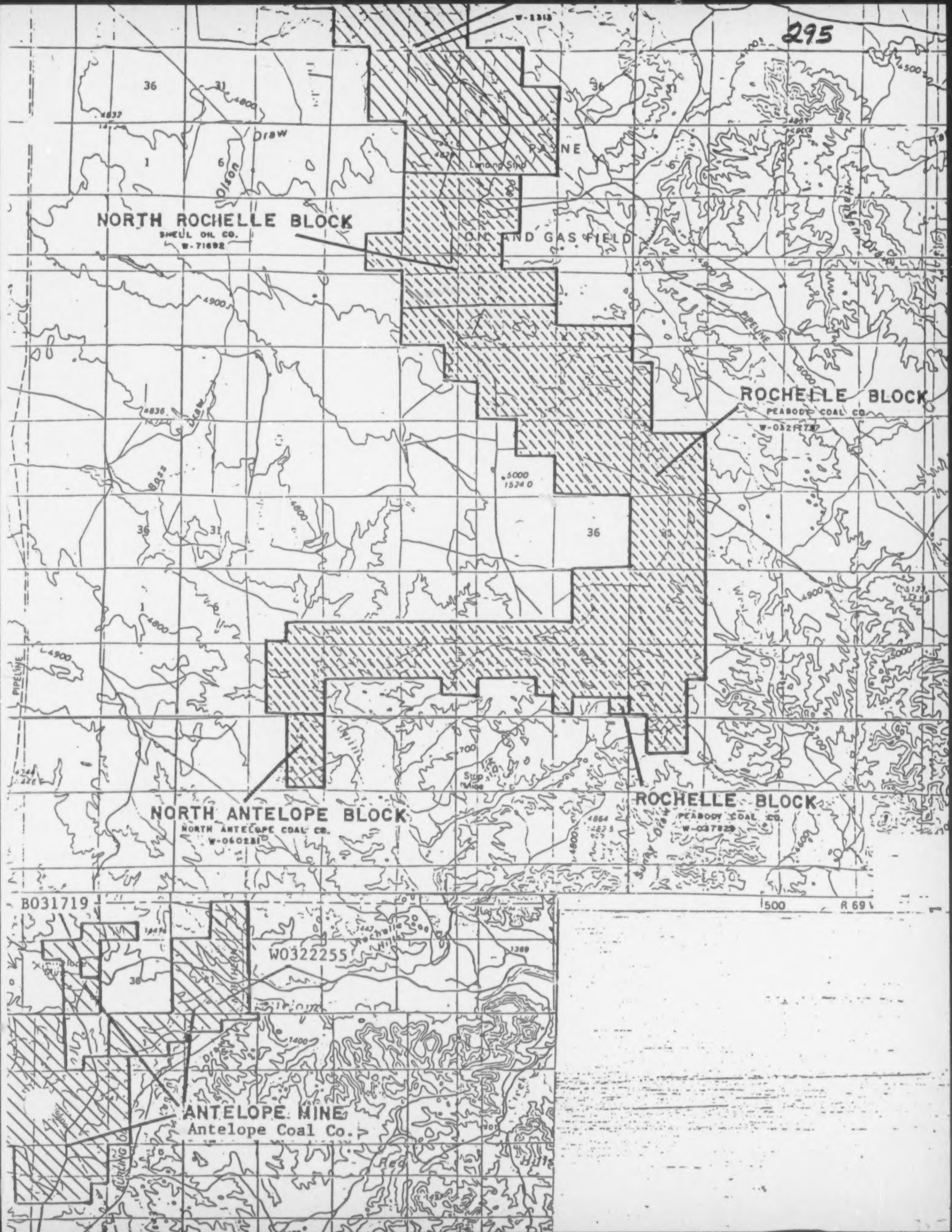
Total recoverable permitted federal in mine plan (mt): --

Total recoverable federal in leaseblock: --

Notes:

This mining proposal had been committed to the WyCoal Gasification Project, which has been delayed, perhaps until about 1990. No alternative market has been identified for this mine, thus its starting date is uncertain.

Lease W0321779 has been divided several ways. Reserves in the southeast portion of the lease will be mined by North Antelope Coal. The northern portion of the lease has no proposed mine plan. The central portion of the lease is the proposed Rochelle Mine.


W-3313
36
31
4800
Draw
Olson
1
6
PAYNE
Landing Strip
NORTH ROCHELLE BLOCK
SHELL OIL CO.
W-71692
OIL AND GAS FIELD
4900
PIPELINE
5000
ROCHELLE BLOCK
PEABODY COAL CO.
Ross Draw
5000
36
31
36
4800
4900
PIPELINE
Strip Mine
NORTH ANTELOPE BLOCK
NORTH ANTELOPE COAL CO.
W-060281
ROCHELLE BLOCK
PEABODY COAL CO.
W-037829
500
R 69 W
B031719
W0322255
Rochelle Hills
ANTELOPE MINE
Antelope Coal Co.
Hills

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
Rochelle	Rochelle Coal Co. (Peabody ⅔ and Panhandle Eastern)	W-0321779	8781*	T42N, R69W Sec 30, 31 T41N, R70W Sec 1, 2, 3, 4, 9 10, 11, 12 T42N, R70W 25 T41N, R69W 6, 7, 18 8, 17	1966		$.20/ton	proposed
		W-37829	40	T41N, R70W Sec 12				

*portion of lease to be mined at North Antelope Mine, other areas not proposed for mining

STATE: Wy **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
Rochelle	Rochelle Coal ~~[illegible]~~	W-0321779 W-37829	6858.5a.		(state) 1280	truck/ shovel, dragline	proposed	11 m.ty

MINE PLAN OR LEASE BLOCK RESERVES:

IN-PLACE: 998.5mt

RECOVERABLE: 411.5mt

SOURCE: mine plan

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY: State of Wyoming 0-26709 (1280acres)

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: WY REGION: Powder River COUNTY: Campbell

MINE NAME OR LEASE BLOCK: Rochelle

LESSEE(S): Rochelle Coal (Peabody)

NUMBER OF LEASES: 2

DATE MINE OPENED: Proposed

PROJECTED CLOSING DATE:

REMAINING MINE LIFE: 38 years

REMAINING RECOVERABLE RESERVES:

FEDERAL:

NON-FEDERAL:

MINE DESIGN CAPACITY 11 mty

RECOVERY RATE: 83%

CUMULATIVE PRODUCTION TO 1979: 0

1979 ACTUAL PRODUCTION: 0

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980			
1981			
1982			
1983			
1984			
1985			
1986			
1987			
1988			
1989			
1990			
Post 1990			

NOTES:

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: Wyoming REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): Rochelle	LESSEE(S) (OR OPERATOR): Rochelle Coal (Peabody)	NUMBER OF LEASES IN BLOCK OR PLAN: 2	MINING METHOD: truck/shovel, dragline

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEA
SEAM NAME	Wyodak							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	'62.7							
BTU/LB	8520							
SULFUR (%)	0.2							
ASH (%)	5.2							
MOISTURE (%)	24.4							
FIXED CARBON (%)	35.4							
VOLATILE (%)	32.0							
SEAM DEPTH	134 (40-220)							
IN-PLACE RESERVES	498.5							
RECOVERABLE RESERVES	411.5							
RECOVERY RATE	83%							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL			498.5	
	SURFACE			498.5	
	UNDERGROUND			–	
RECOVERABLE:	TOTAL			411.5	
	SURFACE			411.5	
	UNDERGROUND			0	

NOTES:

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: North Antelope Mine

Lease Number(s): W60231
W0321779

Location: Campbell County, Wyoming

Lessee: North Antelope Coal Co.
(Peabody Coal and Panhandle Eastern)

Operator: North Antelope Coal

Proximity to Other Operations: Adjacent to Rochelle Mine, two miles north of Antelope Mine

First Coal Shipped: 1985

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 5 mty

Remaining Mine Life: 40 years

Mining Method: Dragline, truck/shovel

Recovery Rate: 94.5%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: --

Pending Actions: Draft EIS in progress; proposed permit area 3762.2 acres

---

Coal Data

Seam Name(s): Wyodak

Thickness (ft): 73.2

Rank: Subbituminous

BTU/lb: 11,800 (dry)

Sulfur (%): 0.40 (dry)

Overburden Thickness: 98 feet

Overburden/Coal Ratio: 1.67

Reserves:

Total recoverable permitted mine plan (mt
189.5

Total recoverable permitted federal in mine plan (mt): NA

Total recoverable federal in leaseblock:
NA

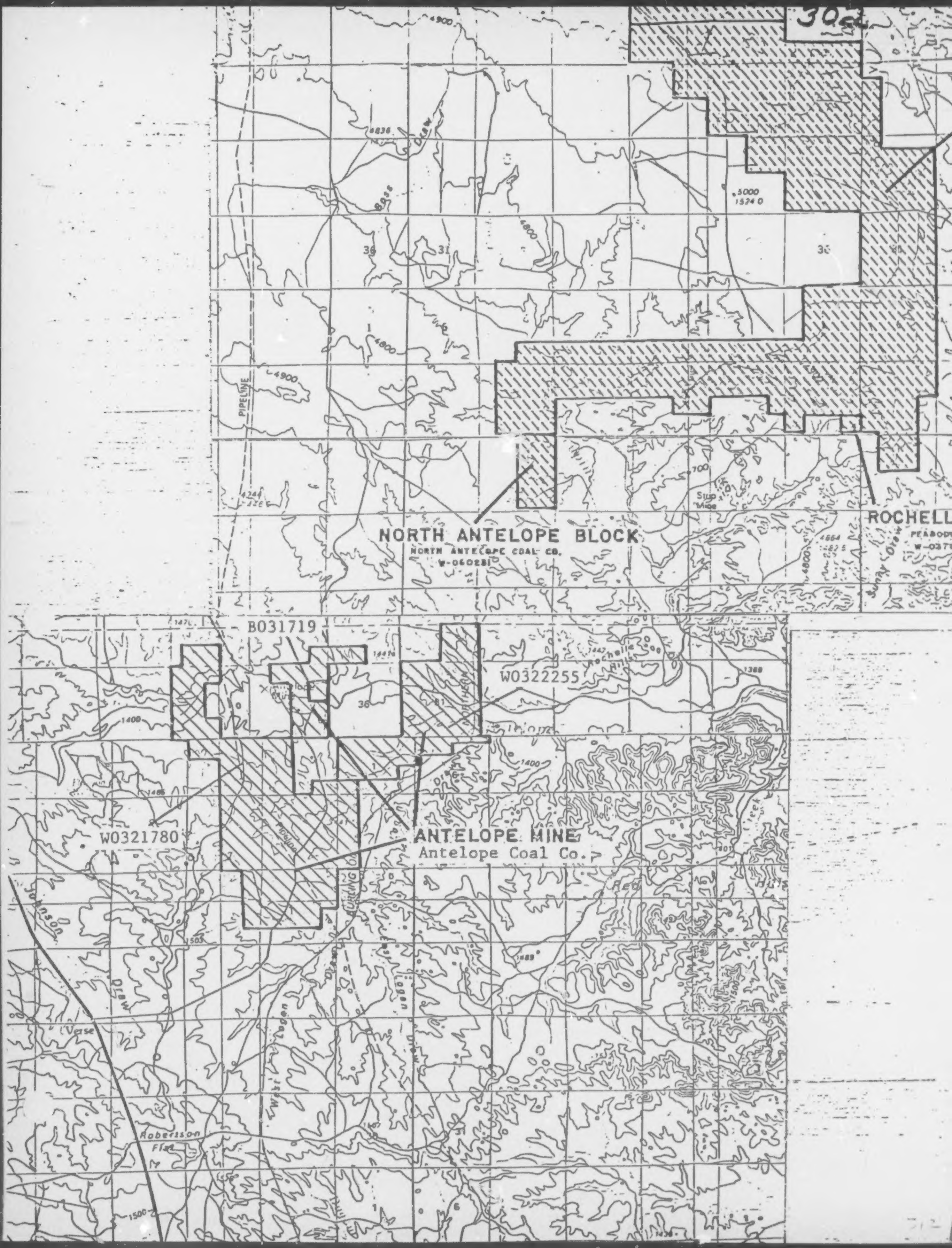
Notes:

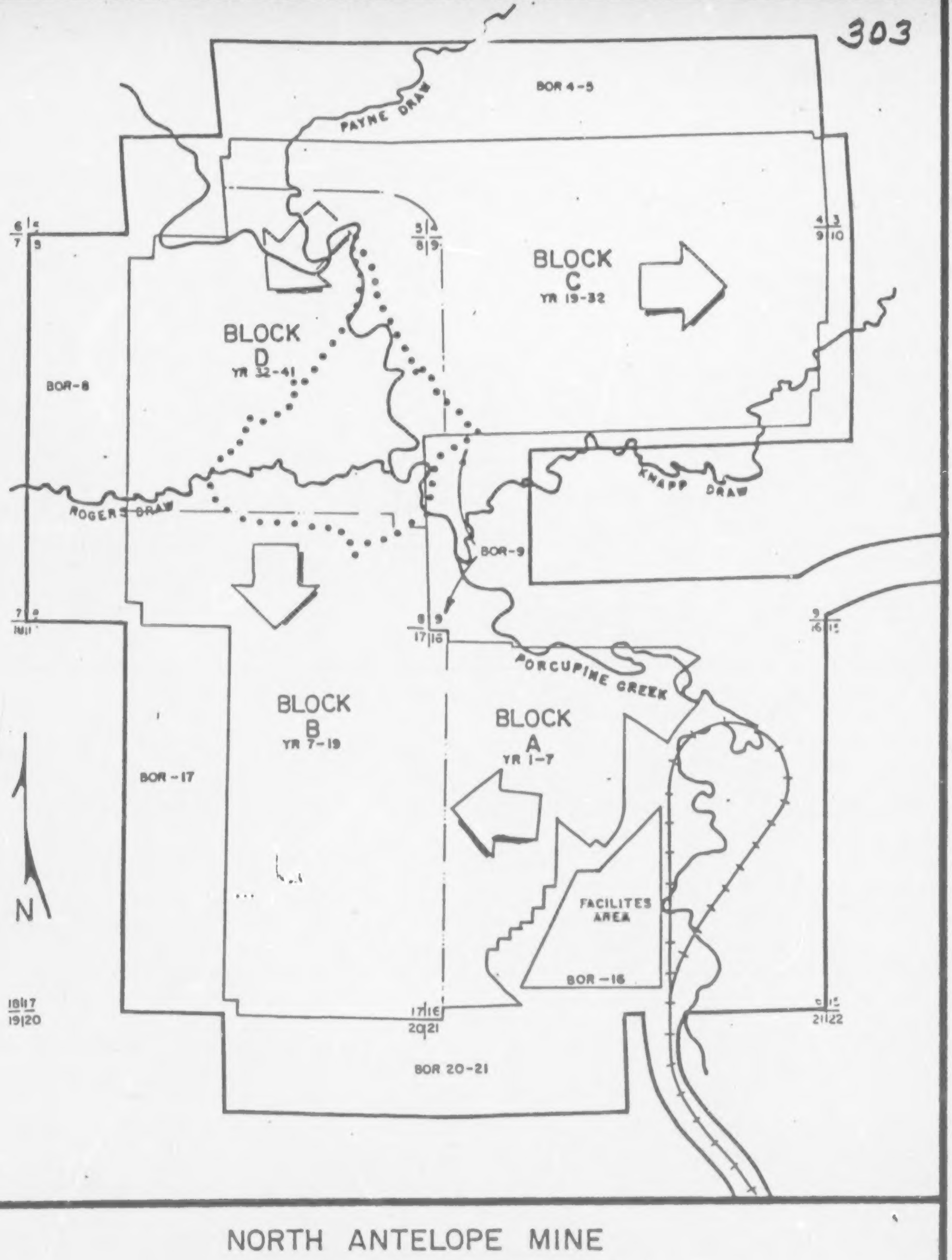
Most of the issues associated with the Antelope Mine are true for North Antelope. An exception is that golden eagle nests are found on the North Antelope site and these will probably be relocated as mining proceeds. Prehistoric sites eligible for the National Register will be nominated as a District.

(continued)

North Antelope Mine

As with Antelope, the Powder River Basin EIS (1979 and 1974) did not address the site-specific mine plan so OSM is in the process of preparing a draft EIS on this mine; it is expected to be released late January or early February 1982. The state prepared a draft technical analysis (December 1981) and it has found deficiencies in Peabody's proposed plan (which will have to be modified in the next two months).


30a
4900
4836
Draw
Bass
4800
5000
1524.0
36
31
36
1
4800
4900
PIPELINE
4244
1293
700
Sup Mine
NORTH ANTELOPE BLOCK
NORTH ANTELOPE COAL CO.
W-060281
ROCHELL
PEABODY
W-037
Sunny Draw
4664
1275
4800
B031719
1447
1447
Rochelle Hills
1369
W0322255
36
31
NORTHERN
1400
1400
1465
W0321780
ANTELOPE MINE
Antelope Coal Co.
Antelope
Johnson
Draw
1503
1489
Red
Creek
Hills
1500
Verse
West
Logan
Logan
Draw
Robertson
Flat
1500
1407
31
1
6
1436


BOR 4-5
PAYNE DRAW
6|5
7|8
5|4
8|9
4|3
9|10
BLOCK C
YR 19-32
BLOCK D
YR 32-41
BOR-8
ROGERS DRAW
KNAPP DRAW
BOR-9
7|8
18|17
8|9
17|16
9
16|15
PORCUPINE CREEK
BLOCK B
YR 7-19
BLOCK A
YR 1-7
BOR-17
N
FACILITES AREA
BOR-16
18|17
19|20
17|16
20|21
16|15
21|22
BOR 20-21

NORTH ANTELOPE MINE
MINE BLOCK DEFINITION

PERMIT BOUNDARY
COAL EXTRACTION LIMIT
BLOCK DIVISION
YR 1-7 COAL EXTRACTION YRS

⇦ DIRECTION OF MINING
• • • • • LAKE HIGH-WATER LINE (RECLAIMED)

FIGURE MP 2

APPROX SCALE 1" = 2000

STATE: Wyoming **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
North Antelope	North Antelope Coal	W-60231	320	T41N, R70W Sec. 4, 5, 8, 9	1979**		$0.175/ton 1st 10 years $0.20/ton remainder (in W 0321779)	(proposed) non-prod
		W0321779	portion of lease allocated to North Antelope Mine with North Antelope Coal as designated operator					

LEASE REFERENCE INDEX

** Reassignment of lease W-0321779, originally issued 1966.

STATE: WY **REGION:** Powder River **COUNTY:** Campbell

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
North Antelope	North Antelope Coal	W-60231	3,762.2	~~320~~		Dragline / truck + shovel	~~non producing~~ {proposed}	5 m.t.y
					{~~640.0~~ ~~state~~}			
		W0321779						

MINE PLAN ~~OR LEASE BLOCK~~ **RESERVES:**

IN-PLACE: 200,515,000

RECOVERABLE: 189,543,000

SOURCE: Mine Plan

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

~~PRLAs listed above maybe either adjacent to mine plan area or in it~~ state

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

*Mentioned in letter from BLM to Peabody in Reassignment of leases to N. Antelope Coal Co. (April 16, 1979)

STATE: WY REGION: Powder River COUNTY: Campbell

MINE NAME OR LEASE BLOCK N. Antelope	LESSEE(S) North Antelope Coal	NUMBER OF LEASES 2	DATE MINE OPENED: proposed PROJECTED CLOSING DATE: est. 2024 REMAINING MINE LIFE: 40
REMAINING RECOVERABLE RESERVES: 189,543,000 FEDERAL: NON-FEDERAL:	MINE DESIGN CAPACITY 5 mty RECOVERY RATE: 94.5%		CUMULATIVE PRODUCTION TO 1979: 0 1979 ACTUAL PRODUCTION: —

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980			
1981			
1982 proposed to open			
1983			
1984			
1985	2	0	2
1986	5	0	5
1987	5	~~0~~ 0	5
1988	5	~~0~~ 0	5
1989	5	~~0~~ 0	5
1990	5	~~0~~ 5	5
Post 1990	5	~~0~~ 5	5

NOTES: 1994 5

All Figures Shown in Million Tons

PRODUCTION SUMMARY

STATE: WY REGION: Powder River COUNTY: Campbell

MINE NAME (OR LEASE BLOCK): N. Antelope

LESSEE(S) (OR OPERATOR): subbituminous

NUMBER OF LEASES IN BLOCK OR PLAN: 2

MINING METHOD: Dragline Truck/Shovel

COAL CHARACTERISTICS:	SEAM 1	SEAM 2.	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Wyodak							
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	73.2							
BTU/LB	11,800*							
SULFUR (%)	.40*							
ASH (%)	7.15%*							
MOISTURE (%)	25.70*							
FIXED CARBON (%)	47.45*							
VOLATILE (%)	43.40*							
SEAM DEPTH	98 (27-220)							
IN-PLACE RESERVES	200,515,000							
RECOVERABLE RESERVES	189,543,000							
RECOVERY RATE	94.5							

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL			200.5	
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL			189.5	
	SURFACE				
	UNDERGROUND				

NOTES: * dry basis

All Figures Shown In Million Tons

COAL RESERVES CHARACTERISTICS

Mine Name: Antelope Mine

Location: Converse County, Wyoming

Lease Number(s): B031719
W0321780
W0322255

Lessee: Antelope Coal Co.
(Pacific Power and Light Co.)

Operator: Antelope Coal Company

Proximity to Other Operations: Two miles south of North Antelope Mine

First Coal Shipped: 1983

1979 Production: 0

1980 Production: 0

Ultimate Mine Design Capacity: 12 mty

Remaining Mine Life: 29 years

Mining Method: Truck/shovel, dragline

Recovery Rate: 95%

Permitted Mine Plan Area: 0

Federal Lease Area Associated with Mine Plan: 4817 acres

Pending Actions: Draft EIS published 10/7/81, proposed permit area 7642 acres, approval expected by April 1982.

Coal Data

Seam Name(s): Anderson, Canyon

Thickness (ft): 18-42 (Anderson)
30-36 (Canyon)
38 (combined)

Rank: Subbituminous

BTU/lb: 7954-9064

Sulfur (%): 0.25

Overburden Thickness: 84 feet

Overburden/Coal Ratio: 2.2

Reserves:

Total recoverable permitted mine plan (mt) 260.3

Total recoverable permitted federal in mine plan (mt): approx. 200

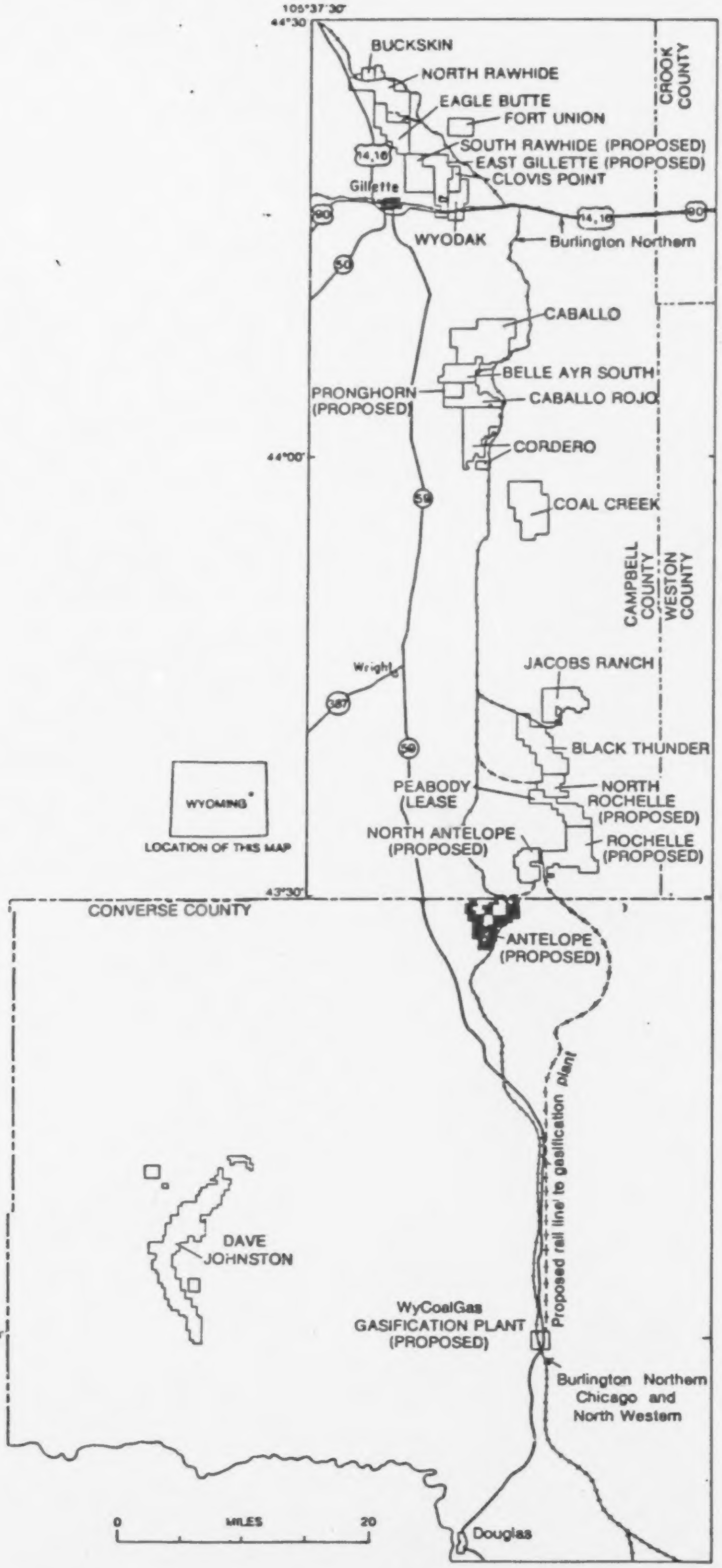
Total recoverable federal in leaseblock: approx. 200

Notes:

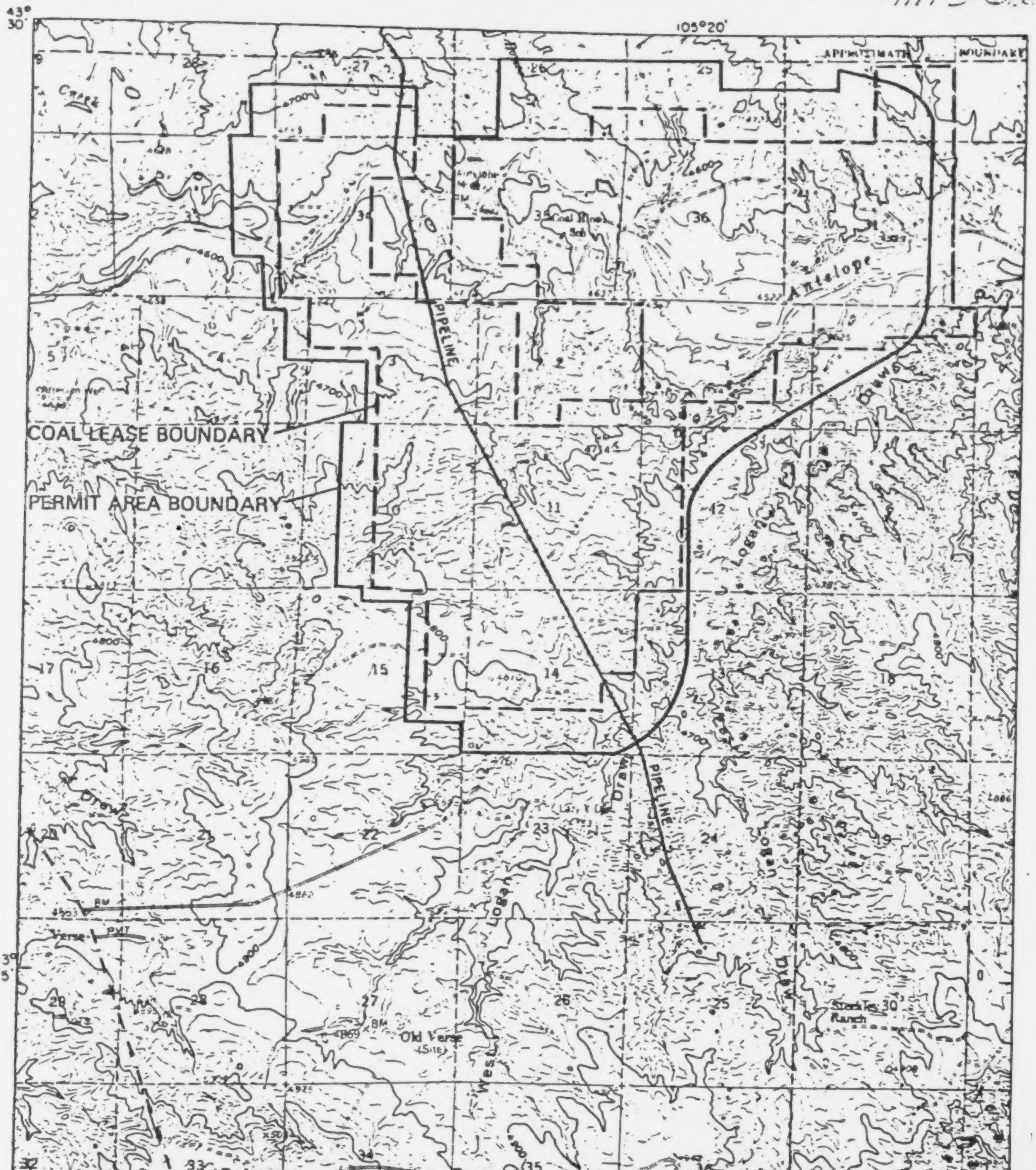
USGS estimates that 37.5 mt of recoverable coal will be left in place under Antelope Creek "to serve as a drainage zone accommodating diversion ditches and sediment control ponds." Antelope Creek, along with portions of Spring Creek and Logan Draw, has been designated an alluvial valley floor. Only Antelope Creek crosses proposed mining areas. Before the company can receive permission to recover the 37.5 mt, it must demonstrate the ability to restore the essential hydrologic functions of Antelope Creek, as well as the ability to control and divert estimated flood flows in the valley. The company has yet to determine if it can economically recover this coal, in light of engineering difficulties.

OSM estimates 0.5 mt of recoverable unleased federal coal will eventually be proposed for mining under agreement with USGS. Other unleased federal coal in center of mine is recoverable, but there is no indication of likely leasing. OSM and State of Wyoming are nominating 48 prehistoric sites found on permit area to the National Register of Historic Places. Cumulative socioeconomic impacts of mine, along with other proposed energy development projects, expected to be "moderately significant" on Douglas and Converse Counties.

Reference: U. S. Office of Surface Mining, 1981. Proposed mining and reclamation plan, Antelope Mine, Converse County, Wyoming: U. S. OSM Draft Environmental Impact Statement OSM-EIS-5.


105°37'30"
44°30'
BUCKSKIN
NORTH RAWHIDE
EAGLE BUTTE
FORT UNION
SOUTH RAWHIDE (PROPOSED)
EAST GILLETTE (PROPOSED)
CLOVIS POINT
CROOK COUNTY
14,16
Gillette
90
WYODAK
Burlington Northern
59
CABALLO
BELLE AYR SOUTH
PRONGHORN (PROPOSED)
CABALLO ROJO
44°00'
CORDERO
COAL CREEK
CAMPBELL COUNTY
WESTON COUNTY
Wright
387
JACOBS RANCH
BLACK THUNDER
WYOMING
LOCATION OF THIS MAP
PEABODY LEASE
NORTH ROCHELLE (PROPOSED)
NORTH ANTELOPE (PROPOSED)
ROCHELLE (PROPOSED)
43°30'
CONVERSE COUNTY
ANTELOPE (PROPOSED)
Proposed rail line to gasification plant
DAVE JOHNSTON
WyCoalGas GASIFICATION PLANT (PROPOSED)
43°00'
Burlington Northern Chicago and North Western
0
MILES
20
Douglas

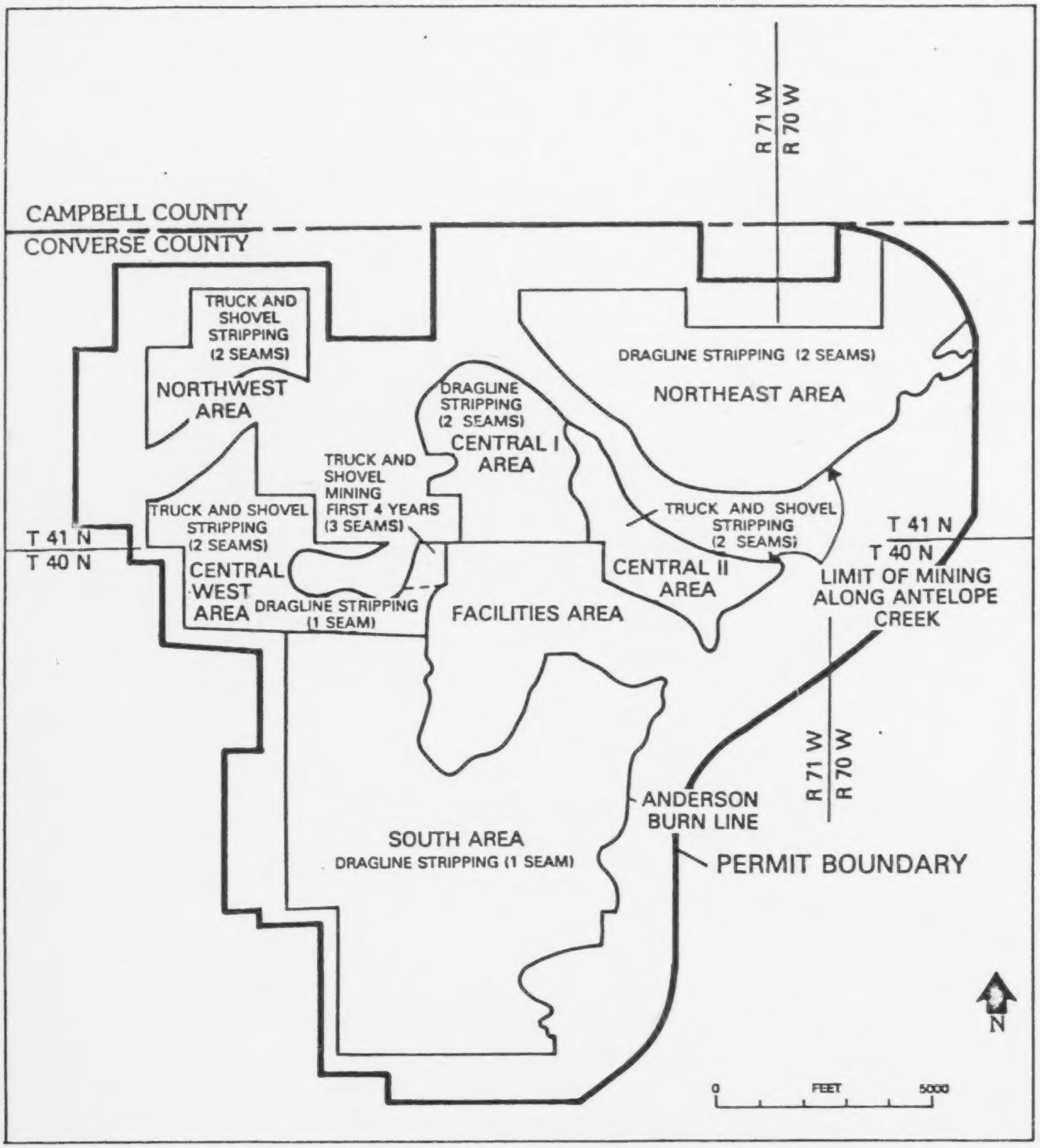
~~Figure I-1~~.--Location of the proposed Antelope mine.
(U.S. OSM, 1980, fig. I-1)


43°
30'
105°20'
APPROXIMATE BOUNDARY
COAL LEASE BOUNDARY
PERMIT AREA BOUNDARY
PIPELINE
PIPELINE
Antelope
Logan
Draw
West Logan
Draw
Old Verse (Site)
Verse
Robertson
Flat
43°
25'
MILES
0
2

Base from U.S. Geological Survey

Figure I-2:--Lease and permit areas.

(U.S. OSM, 1981, fig. I-2)


R 71 W
R 70 W
CAMPBELL COUNTY
CONVERSE COUNTY
TRUCK AND SHOVEL STRIPPING (2 SEAMS)
NORTHWEST AREA
DRAGLINE STRIPPING (2 SEAMS)
NORTHEAST AREA
DRAGLINE STRIPPING (2 SEAMS)
CENTRAL I AREA
TRUCK AND SHOVEL MINING FIRST 4 YEARS (3 SEAMS)
TRUCK AND SHOVEL STRIPPING (2 SEAMS)
TRUCK AND SHOVEL STRIPPING (2 SEAMS)
T 41 N
T 40 N
T 41 N
T 40 N
CENTRAL WEST AREA
DRAGLINE STRIPPING (1 SEAM)
FACILITIES AREA
CENTRAL II AREA
LIMIT OF MINING ALONG ANTELOPE CREEK
R 71 W
R 70 W
ANDERSON BURN LINE
PERMIT BOUNDARY
SOUTH AREA
DRAGLINE STRIPPING (1 SEAM)
N
0
FEET
5000

--Location of mining areas within permit boundary.

(U.S. OSM, 1980, fig. A-3)

STATE: *Wyoming* REGION: *Powder River* COUNTY: *Converse*

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	ACRES	LOCATION	LEASE DATE	RENTAL	ROYALTY	DEVELOPMENT STATUS
Antelope	Antelope Coal Co. (Pacific Power & Light Co.)	B031719[1]	40	41N71W35	11/22/32	$1/a.	[illegible] $.25/t or 50% of prod. royalty	application pending
		W0321780[2]	2908	40N71W1,2,3,10, 11, 12, 14, 15 41N71W27, 34	12/1/66	$1/a.	$.20/t	
		W0322255[3]	1869	40N70W6 40N71W1 41N70W30,31, 41N71W25,26,35	12/1/66	$1/a	$.20/t	

[1] original lessee ~~James R. Learned~~ E.E. Erickson and F. Biemayk
assigned to ~~Pacific Power & Light Co 6/1/1968~~ Gulf Oil Corp.
assigned to Resource Development Co ~~12/1/1977~~ 5/1/79

[2] original lessee Pacific Power & Light Co
assigned to Resource Development Co 12/1/1977

[3] original lessee James R. Learned
assigned to PP&L 6/1/1968
assigned to Resource Development Co 12/1/1977

STATE: Wyoming **REGION:** Powder River **COUNTY:** Converse

MINE NAME (OR LEASE BLOCK	LESSEE(S)	LEASE NOS.	TOTAL (PLAN) ACRES	FEDERAL ACRES	NON-FEDERAL ACRES	MINING METHOD	STATUS	PEAK CAPACITY
Antelope	Antelope Coal Co.	B031719 W0321780 W0322255	7642 a.	surface		truck/shovel, dragline	application pending	12 mty
				3549a	4093a.			
				coal				
				4817a (leased)	800a			
				2025 (unleased)				

MINE PLAN ~~OR LEASE BLOCK~~ RESERVES:

IN-PLACE: 274

RECOVERABLE: 260.3 mt

SOURCE:

All Figures Shown in Million Tons

ASSOCIATED LEASES WITH REASONS WHY:

State of Wyoming leases 0-32383, 26695

COMMENTS:

MINE PLAN OR LEASE BLOCK SUMMARY SHEET

STATE: Wyoming REGION: Powder River COUNTY: Converse

MINE NAME OR LEASE BLOCK: Antelope

LESSEE(S): Antelope Coal Co

NUMBER OF LEASES: 3

DATE MINE OPENED: 1984

PROJECTED CLOSING DATE: 2011

REMAINING MINE LIFE: 29 years

REMAINING RECOVERABLE RESERVES:

FEDERAL: ~200 mt

NON-FEDERAL: ~60 mt

MINE DESIGN CAPACITY: 12 mty

RECOVERY RATE: 95%

CUMULATIVE PRODUCTION TO 1979: —

1979 ACTUAL PRODUCTION: —

MINE PLAN PROJECTED PRODUCTION BY YEAR:	TOTAL ANNUAL PRODUCTION	TOTAL ANNUAL FEDERAL PRODUCTION	COMMITTED/CONTRACTED PRODUCTION
1980	0		0
1981	0		0
1982	0		0
1983	0		0
1984	0.8		0.8 began contract with Platte River Power Authority, Fort Collins, CO
1985	0.9		0.9
1986	1.7		1.7 begin contract with Systems Fuels, Inc. (Louisiana Power & Light)
1987	3.3		3.3
1988	4.1		4.1
1989	5.6		5.6
1990	5.6		5.6
~~Post 1990~~ 1991	8.0		5.6 mty

NOTES:

1992	10.0		↓
1993-2009	12.0		
2010	8.9		
2011	7.3		

All Figures Shown in Million Tons

PRODUCTION SUMMARY

3/5

STATE: Wyoming

REGION: Powder River

COUNTY: Converse

MINE NAME (OR LEASE BLOCK): Antelope

LESSEE(S) (OR OPERATOR): Antelope Coal Co.

NUMBER OF LEASES IN BLOCK OR PLAN: 3

MINING METHOD: truck/shovel, dragline

COAL CHARACTERISTICS:	SEAM 1	SEAM 2	SEAM 3	SEAM 4	SEAM 5	SEAM 6	SEAM 7	SEAM 8
SEAM NAME	Anderson	Canyon						
FORMATION	Fort Union							
RANK	subbituminous							
THICKNESS	18-44	30-36						
BTU/LB	7954-9064							
SULFUR (%)	0.25							
ASH (%)	3.73-11.39							
MOISTURE (%)	23.78-27.73							
FIXED CARBON (%)	33.99-39.64							
VOLATILE (%)	29.50-33.03							
SEAM DEPTH	20-200 (84' avg.)							
IN-PLACE RESERVES	169.6	106.9						
RECOVERABLE RESERVES	161.1	101.6						
RECOVERY RATE	95%	95%						

MINE PLAN OR LEASE BLOCK RESERVES		FEDERAL	NON-FEDERAL	TOTAL	SOURCE
IN-PLACE:	TOTAL				
	SURFACE				
	UNDERGROUND				
RECOVERABLE:	TOTAL	~200	~60	260.3	
	SURFACE	~200	~60	260.3	
	UNDERGROUND	0	0	0	

NOTES:

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All Figures Shown in Million Tons

COAL RESERVES CHARACTERISTICS